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THE SUPREME COURT HANDS DOWN ITS DECISION

A Review and Analysis of the Glass Monopoly Trial and the High Court's Judgment. Government Will File Petition for Clarification and Reconsideration with Supreme Court.

By JOSEPH F. SHARP
Member, Wise, Corlett and Canfield

EDITOR'S NOTE: Because of the protracted period and complexities of the glass monopoly trial as a whole and the recent decision of the Supreme Court, THE GLASS INDUSTRY felt that a comprehensive review and analysis of the case could be most effectively prepared by one not only of the legal profession, but who also could base his analysis on a background of experience in connection with the proceedings. Joseph F. Sharp, whose review follows, seems particularly qualified for the assignment. Mr. Sharp was formerly Assistant United States Attorney for the Southern District of New York. As a member of the firm of Wise, Corlett and Canfield, attorneys for The Stevenson Corporation, now Stevenson, Jordon and Harrison, Inc., he succeeded in securing a dismissal of the case against that corporation by the trial judge.

The Supreme Court handed down its decision in the case involving the principal companies of the glass container industry on January 8th. In general, the majority of the Court, while it sustained the basic findings of the trial court that there were violations of the Sherman Anti-Trust Act and the Clayton Act, substantially modified the injunctive provisions of the final judgment of the District Court in Toledo as they affected the eight remaining active corporate defendants and their officers and agents.

It was a four-two decision. The majority opinion was written by Mr. Justice Roberts and was concurred in by Chief Justice Stone and Justices Reed and Frankfurter. Three of the justices disqualified themselves from consideration of the case.* The two justices dissenting, Mr. Justice Black and Mr. Justice Rutledge, approved the major injunctive provisions of the trial court.

General Plan of the Opinion

In a printed forty-page opinion, the Court first reviewed in broad outlines the early history of the principal corporate defendants and their relationships to each other arising out of contracts relating to the cross-licensing or so-called pooling of patents and the granting of restrictive licenses to other glass manufacturers not defendants. It then pointed out that a great many restrictive provisions of the contracts and practices of the defendants had been terminated voluntarily by the time of the decision of the trial court. It sustained the findings of the trial court that the corporate defendants, Hartford-Empire Company, Empire Machine Company, dissolved in 1941, Corning Glass Works, Owens-Illinois Glass Company, Hazel Atlas Glass Company, Lynch Corporation, Ball Brothers and the Glass Container Association had violated Sections 1 and 2 of the Sherman Anti-trust Act, which sections make it an offense to conspire in restraint of trade and to monopolize, and also found that the defendants Hartford and Lynch had contracted in violation of Section 3 of the Clayton Act, the section which makes it an offense to include so-called "tying" clauses in contracts and which makes it unlawful, among other things, to sell or lease machinery on condition that the lessee or purchaser shall not use the machinery of a competitor. The Court eliminated from the decree, however, the individual defendants J. D. Dilworth, W. V. Fisher, T. C. Fulton and I. J. Collins. The trial court had previously dismissed the action against the corporate defendants, The Stevenson Corporation, Anchor-Hocking Glass Corporation and Liberty Glass Company; and forty individual defendants.

The Court then in one page reviewed the general principles applicable to the situation when patent rights come into conflict with the Sherman law, a limitation upon those rights. This action, being a civil action designed to prevent by injunctions continuing violations of the Sherman Act, left to the Court the task of fashioning the kind of remedy which would clearly prevent

* Justices Murphy and Jackson were connected with the Department of Justice at the time of institution of investigation and prosecution of the glass industry. Mr. Justice Douglas was connected with the Securities and Exchange Commission and other Government activities at the time of similar investigation and prosecution.

what had been held to be violations. In so doing, the Court pointed out that it should resolve doubts in favor of the Government so as to make it unmistakably clear that violations of the character before it should not be repeated. On the other hand, the Court stated that in this situation it was not its function to put the defendants in a "different class than other people," place upon them new duties which could only be placed upon them and the public in general by Congress, or to enjoin "all possible breaches of law." With these principles as a guide, the Court then, in the remaining two-thirds of its opinion, proceeded to give detailed directions for the entry of a new decree by the trial court in a manner effective to prevent repetition of any wrongs which had been committed and the dissipation of the consequences of such wrongs.

The Situation at the Time of Decision of the Trial Court.

At the time of the District Court's decision, all of the principal defendants had removed voluntarily many of the restrictive arrangements as between themselves and with their licenses of glass making machinery. Hartford had reduced its royalties to all licensees in an amount which even the Government did not assert was unreasonable, was treating all licensees on an equal basis and was imposing no restrictions on the use of the machinery leased for the manufacture of any kind or quantity of glassware, comprehended within the decree, i.e., glass containers and certain non-container ware. Owens had likewise removed its restrictive clauses and licenses on its suction inventions, as had Hartford and Lynch on their forming machine licenses. Ball had surrendered its residual exclusive right to the manufacture of fruit jars. From the discussion of the Court, it is obvious that had any of those restrictions remained, they would have been terminated. It does not follow, however, that restrictions and licenses by all companies in the glass or any other industry as to kind and quantity of articles manufactured under patents would be unlawful in every instance.

Prior to the trial, i.e., in July, 1939, The Glass Container Association had changed the statistical reports, which the Court found had amounted previously to an assignment of production quotas, and had ceased to voluntarily exchange statistical data concerning individual company operations. The Association had furthermore abolished by that time a form of statistical statement giving production forecasts and had confined its reports to past performances of the members.

Despite the voluntary removal of the above restrictions, the Court nevertheless sustained the finding that at the time of the trial court's decision, Hartford retained dominance of the gob feeder field; Owens, although its basic patent had expired, retained dominance of the suction field by virtue of its improvement patents; and Owens, Lynch and Hartford were the leaders, if not altogether dominant, in the forming machine field.

Supreme Court's Directions for a New Decree Explicit

Although the Court sustained the substance of those provisions of the decree which would enjoin the defendants from future violations of the Anti-Trust Laws similar to those found to have been committed and allowed a number of the provisions of the decree to stand without comment, it formally vacated the decree. The principal paragraphs of the decree of the Trial Court to which it directed its attention and ordered substantial changes therein, were those relating to the scope of the decree, contractual relationships between the defendants, particularly with respect to various patents owned by them, the license contracts of the defendants to non-defendant manufacturers of glassware and users of glass making machinery, the receivership ordered by the Trial Court for Hartford, provisions relating to stock ownership and directorships of the individual defendants, provisions purporting to regulate the defendants with respect to their present and future patent holdings, the activities of the Glass Container Association, the use of statistics by the corporate defendants, and provisions relating to submission to future investigation by the Government, and to future conduct of the individual defendants.

Changes in Scope of the Decree

The Court restricted the coverage of the injunctive provisions of the decree to the activities of the defendants in the United States and struck from the decree a clause which made it applicable to corporations "controlled directly or indirectly through stock ownership or otherwise" by the corporate defendants on the ground that it was too indefinite for enforcement. It also limited the decree as to Corning, Hartford, and Empire in the non-container field to the findings that they had monopolized trade in "heat resistant ware," or as corrected to conform with the record "ovenware."

Discontinuance of Hartford Receivership and of Impounding of Funds

The Trial Court appointed a Receiver for Hartford and ordered the Receiver to continue the receipt of royalties under Hartford's existing licenses, these to be repaid to the licensees on the decree becoming final. That Court also ordered the impounding of certain sums payable by Hazel to Hartford, by Hartford to Hazel, and by Ball and by Corning. The Supreme Court reversed all the provisions of the decree relating to the receivership of Hartford and the impounding of funds. It ordered the royalties which had been paid to the Receiver by Hartford lessees turned over to Hartford unless Hartford had violated the Anti-Trust Laws since the entry of the receivership decree, and even then that Hartford should receive out of such royalty funds any compensation for services rendered to its lessees during the period of receivership. All of the other funds which had been paid in the Court under contracts existing between certain other defendants were ordered repaid to those companies which paid them into Court.

Provisions Relating to Leasing and Licensing

Provisions of the Trial Court's decree forbade disposition or transfer of possession of glassware machinery (meaning feeders, forming machines, suction machines, lehrs, and stackers) other than by outright sale and required Hartford to offer in writing to sell to all of its present lessees all of the machinery now under lease by it. Similar provision was made for the compulsory sale of such machinery owned in the future by the corporate

defendants. An additional paragraph in the lower Court's decree had the effect of compelling the defendants, if they engage in the distribution of glass making machinery or glassware (containers and certain non-container ware) to file with the Court an agreement (a) to license any applicant *without royalty or charge of any kind* and for the life of the patents to make, to have made for it, or to use any number of such machines and methods used in the manufacture of glassware and embodying the inventions covered by any patents or application *then owned or controlled* by such defendants; and (b) to license *at a reasonable royalty* similar machines and inventions covered by patents *thereafter* applied for or owned or controlled by the defendants; and (c) to make available to any licensee under "(a)" and "(b)" at cost plus a reasonable profit, all patents and drawings relating to the machinery or inventions so licensed.

The Supreme Court held that these provisions were confiscatory and went definitely beyond what was required to prevent future violations of the kind before it, provided that the above "(a)" should be modified to allow the defendants reasonable royalties and made its provisions expressly limited to feeders, forming machines, stackers, lehrs and patents covering these or improvements of them, and that "(b)" should be likewise limited to the licensing of any applicant at reasonable royalties those patents and applications covering feeders, forming machines, stackers and lehrs or their improvements. It further directed there should not be in any future decree a provision for the compulsory sale of machines, patterns and drawings.

The Court gave an example of the necessity of *limiting* the injunctive features of the decree with respect to compulsory licensing of future patents to those covering only *feeders, formers, stackers,* and *lehrs.* It pointed out that if at a later time Ball or Thatcher (and presumably any other defendant) should procure a patent on a bottle capping machine there is no reason for the decree to compel it to license some other company. Presumably it could also license such a machine under the usual rules now applicable to any patent owner for the licensing of his patented machine.

The Court, in narrowing the provisions of the decree of the lower Court relating to the use of patents, said:

> "That a patent is property, protected against appropriation both by individuals and by government, has long been settled. In recognition of this quality of a patent the courts, in enjoining violations of the Sherman Act arising from the use of patent licenses, agreements, and leases have abstained from action which amounted to a forfeiture of the patents."

Moreover it rejected the Government's contention that what would amount to a forfeiture of the defendants patents was not justified by its recent decisions in Morton Salt Company vs. G. S. Suppiger Co. and B. B. Chemical Co. vs. Ellis, both reported in 314 United States Reports. It pointed out that these cases applied only the doctrine that so long as the patent owner was using his patent in violation of the Anti-Trust Laws he could not restrain infringement of the patent by others. The authority of these cases did not justify what amounted to forfeiture of the patents in a prosecution by the Government.

To summarize: with respect to the leasing or selling of patented machinery and licensing of patents relating to feeders, formers, stackers and lehrs owned by the defendants at the time of the decree or thereafter owned, the Court said:

> "The decree should permit any corporate appellant, acting alone, to lease or sell patented machinery or license the use of patents, if it so elects, provided always that no discrimination be practiced and that no restrictive conditions be attached (except as stated in connection paragraph 29) save with the approval of the Court."*

Paragraph 29 of the Trial Court decree, referred to in the above quotation, enjoined the defendants from making any agreements which would restrict (1) the type or kind of product whether glassware or any other product produced under patents licensed thereunder; (2) the use of the product so produced; (3) the character, weight, color, or capacity or composition of the product; (4) the quantity; (5) the market either as to territory or customers; (6) the price or terms of sale or other disposition of the product; (7) the use of the machinery or equipment distributed or the inventions licensed in connection with any other machinery or equipment, or (8) which would include one or any of a number of other provisions which restricted the rights of licenses or discriminated as between them. The Court held and the Government agreed that this paragraph "29" should be limited to glass making machinery (feeders, forming machines, suction machines, stackers and lehrs) and glassware (containers and certain non-container ware). The Court's position with respect to the right of the defendants to use patents acquired after the date of the decree and excepting those applicable to feeders, forming machines, suction machines, stackers and lehrs, and glassware as defined, was clearly stated as follows:

> "Paragraph 29 should be amended to permit any appellant, corporate or individual, to retain and refuse to license, to use and refuse to license, or to license with restrictions, any patent hereafter applied for or acquired except those applicable to feeders, formers, stackers and lehrs and processes and methods applicable thereto."

The same general principles were made applicable to agreements entered into between the defendants after the date of the decree. These were either all ordered cancelled or if they had been cancelled, were enjoined from reinstatement or from like contracts being entered into in the future. One exception was made with respect to the agreement entered into between Hartford and Corning on September 23, 1940. In that agreement Corning had acquired three patents in order to avoid possible infringement action by Hartford against it. The Court held that the acquisition of these patents would not tend

(*Continued on page 93*)

* Some statements in the opinion of the Court indicate that the Court intended to permit complete freedom of licensing of all patents or applications acquired after the date of the judgment of the Trial Court, including those covering feeders, formers, stackers and lehrs. However, upon consideration of all that the Court said with respect to the licensing of patents on glass making machinery, we are of the opinion that the Court did intend to place the limitations which have been set forth in this article upon the licensing of after-acquired patents relating to feeders, formers, stackers and lehrs, or improvements thereon and methods and processes involved in their construction and operation.

ANALYSIS OF GLASS FRACTURES

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When glass fractures, characteristic patterns form on the newly exposed surface which are indicative of the stress conditions existing in the glass at the instant of fracture. By preparing fractures under controlled conditions, it has been possible to correlate the fracture patterns with the stress conditions, thus permitting an analysis of unknown glass fractures. Useful information may be determined as to the origin, cause, and direction of the fracture on both large and small sections of glass.

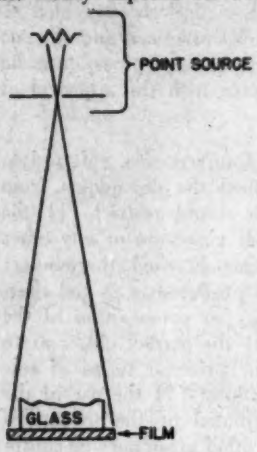

Fig. 1. — The above arrangement was used to shadow photograph a fractured surface. The desired section is removed from the remainder of the glass and the surface opposite to the fracture pattern is ground and polished. The polished surface is placed directly upon the photographic film and light from a point source is passed through the glass onto the film. The thickness of the glass strips used was about ¼ inch. This, however, depends primarily upon the distance and type of point source used.

In 1926 F. W. Preston published his observations on the rupture of glass in which he correlated various fractures of glass into a system based upon the initiating stresses and the origin of the fracture.[1] Two types of surface marks were discussed which have become of particular interest in fracture analysis — rib and hackle marks.

Recently J. B. Murgatroyd presented a further study of "rib-marks" and "hackle-marks" appearing on the surface of fractured glass and correlated the marks specifically with an analysis of the known conditions causing the fracture.[2]

Both authors present the fundamental conclusions of their investigations clearly. However, the photographic reproductions made with reflected light from the glass surfaces fail to show much of the detail of the fractures. This lack of detail led to a search for a more illustrative method of recording the markings of fractured surfaces both for demonstrating the procedure of fracture analysis and for recording permanently the results of investigations involving an analysis of a glass fracture through surface marks.

The difficulty of photographing the surface characteristics of fractured glass with reflected light was eliminated by using the technique of shadow photography with transmitted light from a point source (Fig. 1). A few samples have been selected to illustrate the results obtained by this method and to show how the surface marks may be interpreted. All the illustrations have been taken from actual samples fractured under known conditions of tension and compression. The stress conditions were varied by the method of support of the glass and the manner in which the glass was struck to cause fracture.

The long curved lines in Fig. 2 (a) have been designated by Preston as "rib-marks" while the shorter straight lines are one form of the "hackle-marks." These two types of marks make it possible to determine to a limited extent the following information concerning a fracture:

(1) Origin of fracture.
(2) Direction in which fracture traveled.
(3) Regions of tension and compression at time of fracture.
(4) Type of fracture—slow traveling or explosive.
(5) Strain condition of glass—tempered or untempered.
(6) Type of shock causing fracture — physical or thermal.
(7) Type of physical shock—sharp severe blow or steady force.

Interpretation of Rib-Marks and Hackle-Marks

Much of the significance of the rib-marks found on fractured surfaces is probably unknown. Experiments indicate, however, several practical details. The fracture always passes in a direction which approaches the rib-

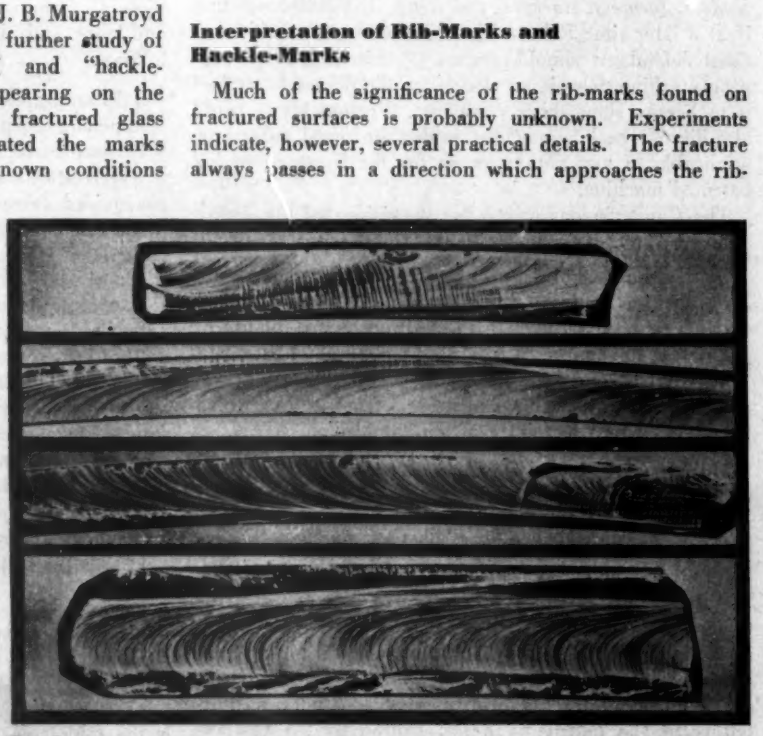

Fig. 2

[1] F. W. Preston, "A Study of the Rupture of Glass," *Journal of the Society of Glass Technology*, *10*, 234 (1926).

[2] J. B. Murgatroyd, "The Significance of Surface Marks on Fractured Glass," *Journal of the Society of Glass Technology*, *26*, 156 (1942).

Fig. 3

mark on the concave side and leaves on the convex side. In a region of tension the fracture will travel rapidly, leaving the rib-marks spaced further apart than in a region of compression. A nearly uniform stress is indicated by slightly curved, evenly spaced rib-marks.

When a slow moving fracture halts a single well-defined rib occurs at that point. Examples of this are the rib-marks ab and AB in Fig. 6. Here the fracture originated at O on the surface, passed slowly to ab where it came to a halt and then passed on to AB where it came to a second halt. At this point the fracture was intentionally completed with a physical blow to permit examination of the fractured surface.

Hackle-marks on a fracture surface indicate failure of the glass under a strong shearing force and usually appear when the fracture is of an explosive nature. The presence of the marks thus indicates in general that severe thermal or physical forces had a prominent part in causing the fracture. Hackle-marks are always found to pass through rib-marks at right angles and thus can be used to determine the direction of the fracture when rib-marks are not present.

Every fracture will be found to present its own individual characteristics. By combining available information as to the conditions under which a fracture occurred with the general information given above, one may often determine the cause of the fracture. Such a method of analysis has proved extremely useful in determining if fractures occurring in thermal and physical shock tests were actually due to the method of mounting or the applied shock. It also serves as a check on cause of breakage in manufacturing operations and often provides a basis for revising certain operations.

In viewing the fractures it is often necessary to use a magnifier and to vary the position of the light source to cause reflections at various points on the surface.

Illustrations

Fig. 2 consists of a series of photographs showing fractures which progressed uniformly in one direction under fairly constant conditions. The samples have been arranged with the convex side up in each instance and have been fractured to illustrate that the curvature of the glass does not necessarily have a direct influence upon the fracture. The fractures shown occurred when the applied force varies in intensity across the section.

The following known conditions under which the fracture occurred may also be determined from the surface markings:

(a) Fracture passed from left to right with maximum tension on top and compression on bottom. The strong hackle-marks indicate the fracture to have been caused by a severe blow.

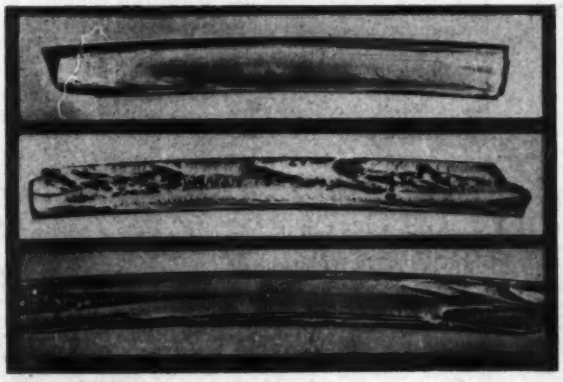

Fig. 5

(b) Fracture passed from right to left with maximum tension on bottom and compression on top. The small hackle-marks near the upper surface are a result of the compression zone suddenly changing to tension.

(c) A heavy blow was struck on the lower surface of the right end where the fracture originated. The break traveled from right to left with the tension zone on the upper surface.

(d) The surface marks in this instance indicate the tensional stress to have been nearly uniform across the section. The fracture was produced by a fairly weak physical shock which passed from right to left with the compressional surface on the upper side. The hackle-marks on the upper surface indicate a sudden change of the compressional region into tension.

The fracture patterns shown in Fig. 3 include the origin of the break.

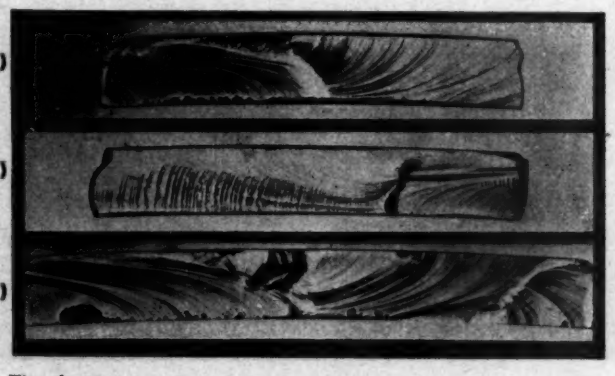

Fig. 4

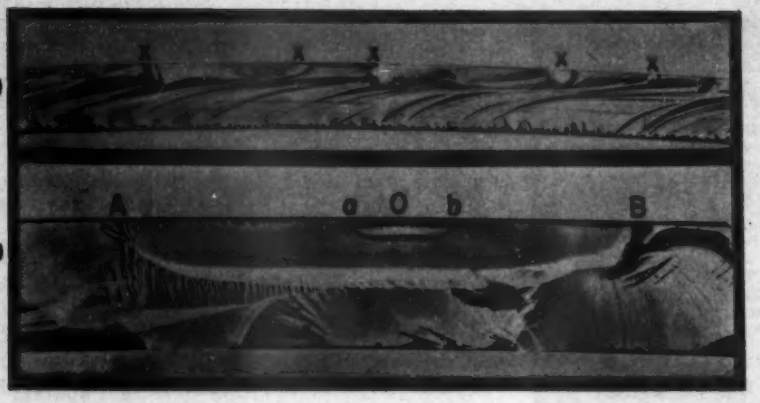

Fig. 6

(a) The fracture originated at the lower surface and radiated to the left and right with tension on the bottom and compression on the top surface.

(b) This fracture is similar to (a) but on a thicker section of glass. The hackle-marks along the upper surface indicate a somewhat severe blow. A diamond cut was used on the lower surface.

(c) While this fracture was produced in a similar manner it differs from the above two samples in having the lower surface in a state of compression and the upper surface in a state of tension. When the shock was applied to the glass, the top surface was placed under compression for an instant. The actual fracture probably occurred as the compressional wave faded out and the top surface passed momentarily into a state of tension. This would permit the fracture to originate under tension at the surface point where a flaw was introduced by the applied shock. This is a typical pattern for large sections of pot glass where it is difficult to place the surface opposite the blow under a state of tension. On the left end of the strip the lower surface changes from a state of compression to tension.

The conditions of stress in the glass often change as the fractures progress. This is particularly true of large sections of glass. Such a change may be detected easily on the fracture pattern as shown in Fig. 4.

(a) The fracture passed from left to right. The conditions of stress changed about halfway and the first half of the pattern indicates tension on the lower side while the second half shows tension on the upper side.

(b) This sample is similar to (a) with the fracture passing from right to left. The addition of hackle-marks indicate a severe blow on the left portion of the fracture.

(c) As the fracture passed from left to right the conditions of stress on the lower surface changed from tension to compression to tension.

When glass is heat-treated to resist thermal and physical shock the surfaces are placed under compression and the central region under tension. One of the theories of fracture of glass assumes that rupture occurs when the tensile stress reaches a given value. While this theory is not entirely satisfactory it receives general support from fracture patterns on tempered or heat-treated glass. As stated above, the maximum tension on a tempered sample occurs in the central region. The illustrations of Fig. 5 are from fractured tempered glass. In each instance the fractures indicate the top and bottom surfaces to be under compression at the time of fracture and the center

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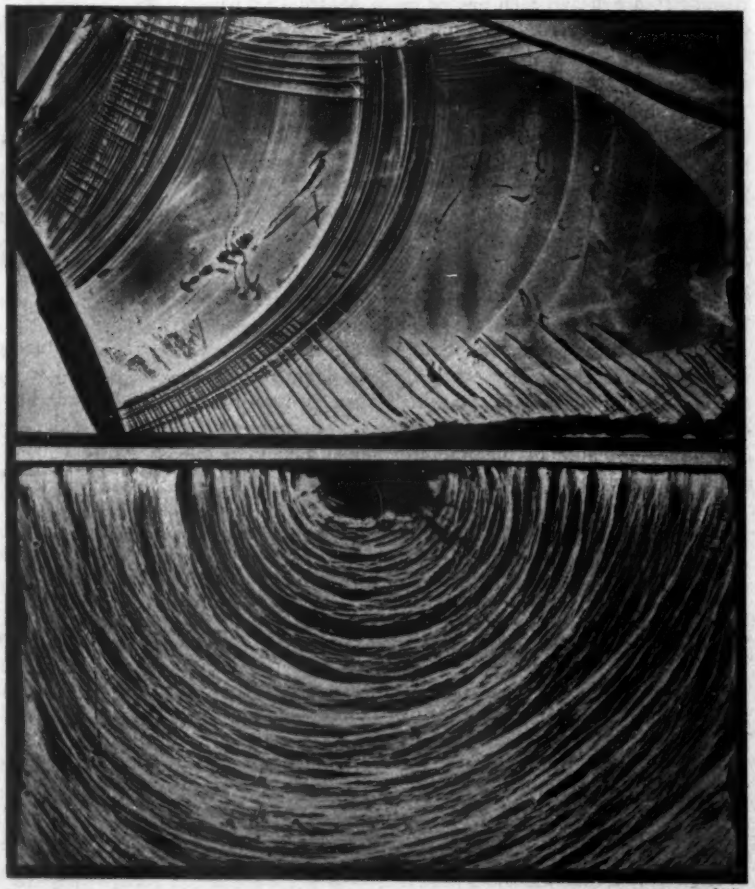

Fig. 7

FURNACE OPERATION AND CONTROL

(FURNACE OPERATION)

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PART II

The question has come up on a number of occasions regarding the most desirable temperature distribution curve for a glass furnace. This is not so simply answered since more than one curve will work depending upon the overall temperature level and the residence time in the furnace. However, in Fig. 4 is shown an actual, steady-state temperature curve which the writer feels is representative of the ideal in present day furnace operation and performance.

Temperature Distribution Curves

On this graph (Fig. 4) the bridgewall temperature is taken as zero and the optical temperature through the whole distance of glass travel from charge to discharge is shown based on the difference from bridgewall temperature.

The load conditions on the furnace were steady at 129 tons/day of flint container glass—corresponding to a melting rate of 4.6 sq. ft./ton pulled. The furnace is fired with producer gas through four side ports of staggered widths.

The optical temperatures in the melter are sighted in the direction of flame travel on a point just above the glass line, at a distance of about a foot off to the bridgewall side of each port. The readings of course are registered an instant after the flame disappears on reversals, and are reproducible within less than 10 deg. F.

If we were to start with the furnace full of glass but not feeding raw batch, the temperature distribution curve over the length of the melter from the backwall to the bridgewall would of course be much flatter than shown, but still showing some hump midway in the furnace—the furthest distance from the ends and also the region of largest port opening. As the cold raw material is fed in on a steady cycle by the batch feeder, the temperature at the charging end naturally seeks a lower equilibrium level, thereby pulling that end of the curve down and accentuating the hump. The point, or rather zone of maximum temperature lies at approximately the mid-point in the melter, which is the condition for optimum operation, and 75 deg. F. above the bridgewall temperature.

Following Fig. 4 further it will be noted that the curve shows a dip below the level of the bridgewall in the neighborhood of the 4th port. On a 5 port furnace this dip will show at the 5th port. This phenomenon is common to every furnace at least at high rates of pull; at low rate of pull it usually disappears. This dip has in the past been attributed to the fact that the bridgewall optical is sighted through the rearwall and hence the flame in the field of view clears an instant quicker than is the case of the 4th port reading, which is sighted through the end of the port. Possibly, however, this is merely a corner-effect, since the heat loss through the exposed corner should be greater than from the bridge and the bridgewall "sees" more of the zone of maximum temperature than does the sidewall corner.

Following Fig. 4 past the bridge, it will be noted that a drop of 450 deg. F. exists across the throat from the melter to the center of the refiner. The temperature curve thereafter branches off of course into the various forehearth conditioning curves in preparation for gob feeding. The respective slopes of the latter curves are of course dependent to a large extent on rates of tonnage pulled, and the gob temperatures desired.

Reference to Fig. 5 shows the same overall picture for a second furnace identical in all respects with the furnace of Fig. 4—except for some of the refractory materials employed. The rate of pull is lighter in this case; 89.5 tons/day equivalent to 6.63 sq. ft./ton. The glass composition is identical.

Attention is directed to the fact that the curve traversing the melter is flatter in Fig. 5, and the dip in front of the bridgewall is gone. This has an explanation as follows: Both furnaces are well along in their "campaign life." The furnace of Fig. 4 still has the original checkers, which are naturally plugged a good deal more under the first two ports in proportion than in the third and fourth ports. Therefore, the first two ports tend to run smoky and in order to clear up his fires the operator will tend to run with more combustion air. This then leaves the first two ports with a neutral combustion product, but forcing the third and fourth to run with excess oxygen. The net effect is to force the "hot spot" upward in relation to the bridgewall temperature.

On the other hand, the twin furnace (Fig. 5) has had a checker repair, under the first two ports, leaving the third and fourth ports still in their partially constricted state relative to the first two. The net effect here is the opposite: the last two ports tend to run on the smoky side and in order to keep smoke out of the refiner the operator will increase combustion air. The first two ports then are the ones that run lean, forcing the temperature level down at the "hot spot" in relation to the bridgewall. This accounts for the flatter curve of Fig. 5. When new, either furnace would run on a curve somewhere in between the two.

In passing it might be noticed that the drop in temperature across the bridge in Fig. 5 is only 200 deg. F. as compared with 450 deg. F. for Fig. 4. The shadowwall is the same in both. However, the throat of Fig. 5 has been over-coated and has eroded away to a much larger opening. The cooling demand on the forehearths has been increased thereby by approximately 50 per cent.

Getting back to the general subject of the melting operation itself, a considerable amount of controversy has revolved generally around the "hot spot"—point

"X," as it has been labeled. In the producer gas-fired furnace of Figs. 4 and 5, the fuel is distributed in large volume to each of the 4 ports, fixed proportionately by the respective port dimensions. It is this feature that goes to make for a stable curve—stability being of major importance.

By any other method of firing, wherein fuel is distributed by comparatively small "burner" openings or jets at each port, it is possible to deform this curve, either voluntarily or by neglect of burners, involuntarily. The point of maximum temperature with a little more effort can also be shifted to one side or the other from its normal position off the second port on a four port furnace, or from its normal position off the third port on a 5 port furnace. This will of course be accomplished only at the expense of unbalanced fuel air ratios on the respective ports, in any case where the distribution of the secondary combustion air is in proportion fixed by the port dimensions.

Producer gas is a dilute fuel, natural gas more concentrated, and heavy fuel oil of course is at the other extreme of concentration short of the solid state. The relative ease of holding a stable shape and position for the temperature distribution curve is in inverse order of concentration.

"Hot Spot" and the Foam Line

The position that the foam line assumes is of interest. The safe rule for normal operation has always been that no unmelted batch shall pass beyond the "hot spot" or point of maximum temperature, on the theory that the natural convection currents bring glass to the surface at that point and direct a current toward the backwall and another current toward the bridgewall, hence any

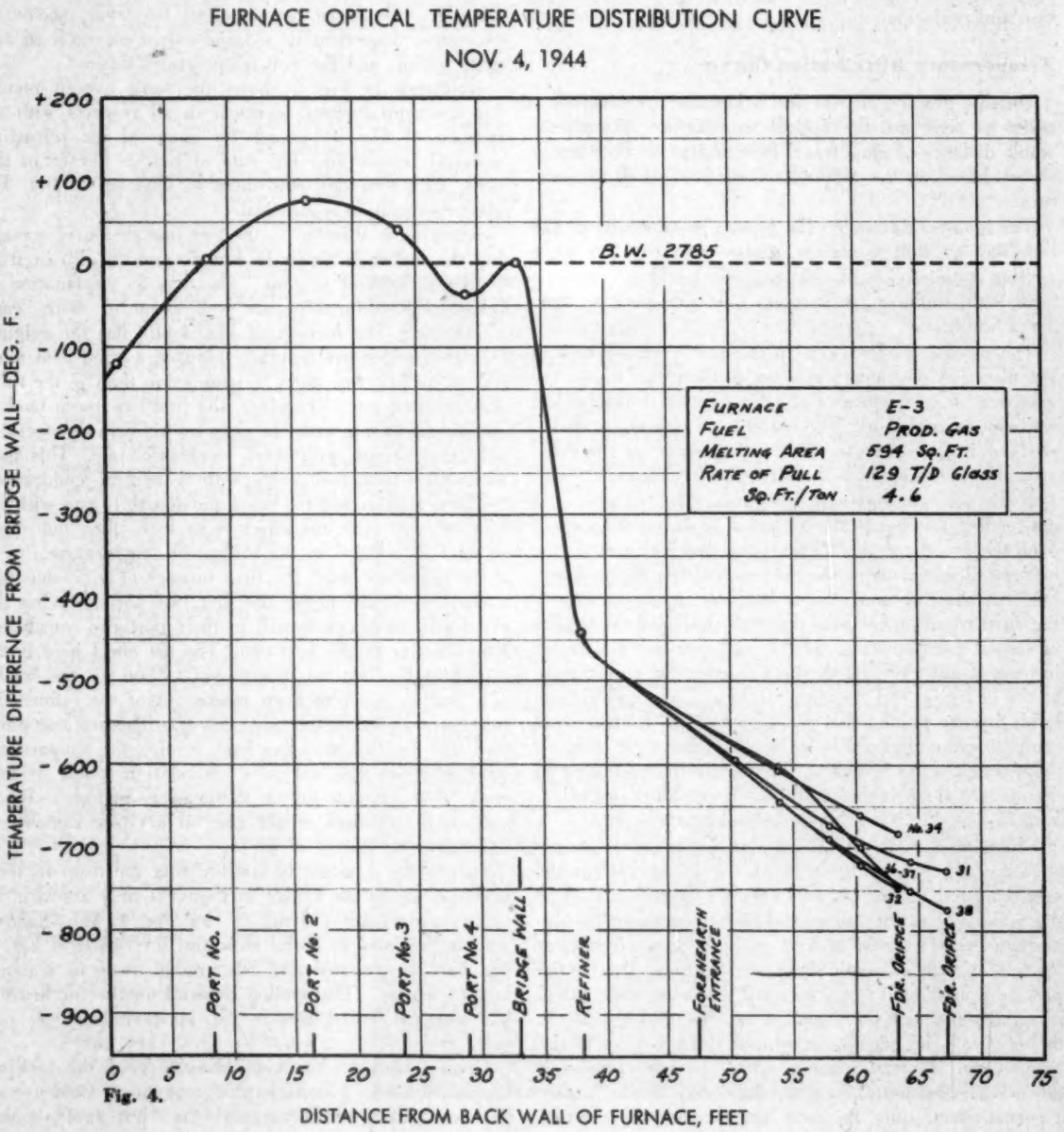


Fig. 4.

unmelted material trapped in the latter is hastened toward the throat. I think everyone feels safer when he sees a nice uniform foam blanket, ending in a sharp line in the position of the "hot spot" with a clear mirror-like surface to the glass beyond. Under those circumstances the natural convection force is in balanced opposition to the surface push of the batch feeder. However, if the overall temperature level is dropped, the batch feeder will push unmelted batch beyond that point, "hot spot" or no "hot spot." Likewise with concentrated feeding of batch in one direction a procession of batch piles will parade down to the bridgewall, be deflected and even double back on itself. With the old style of simple pusher, the raw charge can be made to follow any furrow that is started manually with a long handled hoe, to the bridgewall if necessary—until checked by starting another furrow. It appears then that these surface convection currents are rather weak by comparison with surface displacement.

For this reason and also to prevent the decomposition gases from being evolved too quickly in the melting process, the amount of "soaking time" between the backwall and the first port is very important. This region should not become too hot since the more fluid the glass in that area becomes, the more easily the unmelted float already residing there is displaced ahead of the charge. It is best to adjust the fuel input to the first port insofar as possible so that the "soaking" area is just fluid enough to enable the batch feeder to displace the cold material ahead of it. In the writer's opinion the first port for that reason should not be the largest port in the furnace in the best designed arrangement.

In any furnace the general rule still holds that no

(*Continued on page* 88)

FURNACE OPTICAL TEMPERATURE DISTRIBUTION CURVE

NOV. 6, 1944

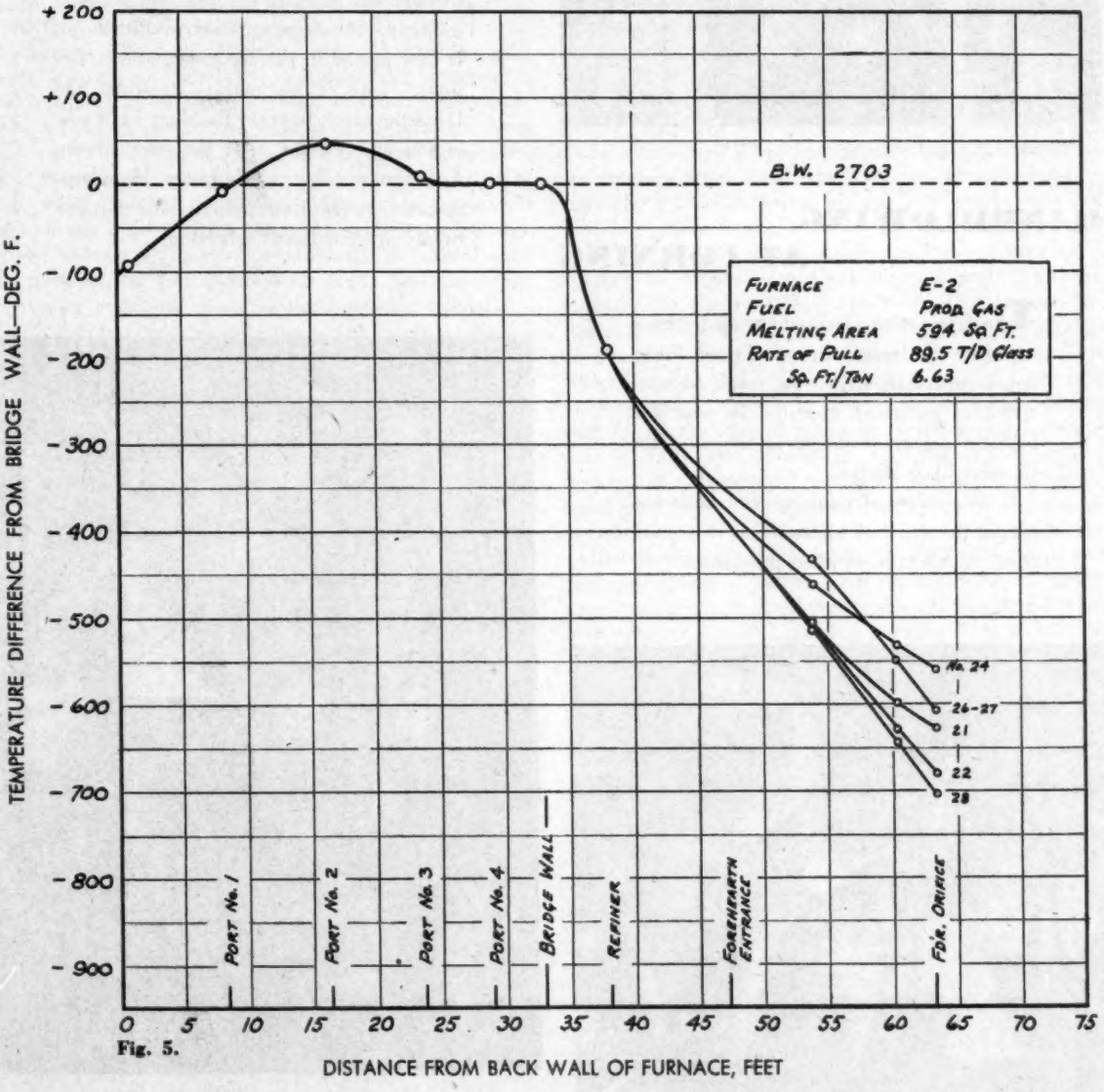


Fig. 5.

Although Mr. Fiene's work includes a wide and diversified range of subjects he has devoted much of his time and talent to industry. A series on steel in Pittsburgh is now owned in private and public collections. One of his murals decorates the Department of Interior Building in Washington and another tells the story of the American needle trade industry. He is represented in the Metropolitan Museum and twenty other national collections.

HANDBLOWING AT CORNING

The fascination of glassblowing by hand captured the imagination of Ernest Fiene, noted American artist—the result being a series of paintings executed in true and brilliant colors in the hand shops of the Corning Glass Works.

In this series of paintings the artist has caught the spirit of teamwork as it is practiced in this type of glass production.

SURVIVAL OF U. S. HAND-MADE GLASSWARE DEPENDS ON TARIFF PROTECTION

A review of tariffs and trade agreements as they affect the Hand-Made Illuminating, Table and Ornamental Glassware Industry

By H. L. DILLINGHAM
Business Manager, American Glassware Association

PART II

The full impact of tariff reduction in trade agreements has not yet been felt by manufacturers of illuminating, table, and ornamental glassware except for the short period that the Czechoslovakian Trade Agreement was in effect from April 16, 1938, to April 22, 1939. During that period world conditions were not normal. Germany was at the borders of Czechoslovakian glass making areas, ready to pounce on them at any moment, thus disturbing Czechoslovakian production. The importers in this country, realizing the unfavorable world trade conditions, were trying their best to get deliveries on whatever goods they had in any European country. They, then, were seeking United States sources of manufacture from which they could hope for an uninterrupted future supply. Statistically or otherwise, it is impossible to judge just what effect the Czechoslovakian Trade Agreement had on the United States hand-made glassware industry.

The volume of hand-made glassware imported under the Swedish and United Kingdom Trade Agreements has been very small, as shown in the foregoing tabulations. The Swedish Trade Agreement affected glassware having a value of $8.00 or more each in country of origin (incorrectly quoted as $1.00 or more each in Part I of this article, January issue) and the United Kingdom Trade Agreement applied to table and ornamental cut or engraved glassware having a value of $1.00 or more each in country of origin. Both agreements cut the U. S. tariff only on luxury lines of glassware which, prior to the present war, had a limited sales volume in this country because of the small number of people who had the money to purchase it. In the postwar period, however, the possibility of greatly accelerated sales of high grade ware in this country exists and the importance of foreign made luxury ware becomes a real threat to the United States hand-made glassware industry.

One fact, however, is certain—from 1935 to 1937 inclusive, *without any trade agreement aid of tariff reduction*, the total imports of illuminating glassware increased 251 per cent, and during the same period hand-made table and ornamental glassware increased 91 per cent. As these increases occurred under the higher tariff rates of the 1930 Tariff Act, it is fair to assume that the volume of these same imports during a postwar period in the future will be considerably greater if trade agreement tariff reduction aid is granted on them. If this is untrue, then the objectives of the trade agreements are not attained for on every side we are informed we must have large imports if we are to become an exporting nation. There is no need for making trade agreements on this glassware inasmuch as foreign manufacturers already sell for less than United States manufacturers under the present 1930 Tariff rates, and the U. S. total consumption of glass is not increased. The only effect is to have a larger portion of the market supplied by foreign manufacturers with whom U. S. manufacturers cannot compete because of high wages paid to workers in this country.

United States machine-made glassware provides an abundant supply of lower-priced ware, purchased by the consumer for everyday utilitarian use. This glassware is sold at lower prices than foreign hand-made ware can be imported. This condition would prevail even if the United States import duty were entirely removed by trade agreement. Why then deprive the government of the revenue from tariffs on imported hand-made ware when the United States buying public is amply provided with low priced merchandise to supply its requirements.

The Bureau of Foreign and Domestic Commerce made a survey of conditions in the hand-made table glassware industry for the years 1937 to 1940. That survey disclosed that in 1937, 22 per cent of the total consumption of this ware in the United States was imported. This percentage dropped to 19 per cent in 1938, 17 per cent in 1939, and 8 per cent in 1940. This percentage decline was due to the lack of shipping facilities and interruption of European production facilities caused by the threatening and eventual war in Europe and the growing consumer disfavor of Japanese goods because of Japanese aggression.

That these large importations of 1937 will return and perhaps increase if unwise tariff reductions on this glassware are made in postwar trade agreements is what makes the hand-made glassware industry so apprehensive. These fears are not without foundation as manufacturers realize that they cannot exist unless they have some way of equalizing the higher labor rates paid in this country with the low rates paid in foreign countries.

As proof of the small profits in the industry, the above mentioned government survey shows the following condensed operating net profit and loss percentage statement for the hand-made glass tableware industry:

Year	No. of Firms Reporting	Average Net Profit & Loss	Profitable Firms		Unprofitable Firms	
1937	16	4.57%	9	8.62%	7	—3.02% (loss)
1938	16	—3.59% (loss)	6	4.53%	10	—13.44% (loss)
1939	21	1.74%	9	8.84%	12	—9.65% (loss)
1940	22	5.05%	12	10.04%	10	—7.96% (loss)

The survey is estimated by the Bureau of Foreign and Domestic Commerce to include 90 per cent by dollar

volume of the hand-made glass tableware industry and therefore is representative.

Under favorable conditions, a large percentage of the industry has operated unprofitably. Under less favorable conditions, there is far less prospect of success where foreign manufacturers would enjoy greater advantages.

Why this large number of unprofitable concerns in the industry? Again it is competition from imports. Many of these companies manufacture non trade mark ware which is not purchased by name by the consumer. The store buyer is thereby placed in a position to bargain with these manufacturers based on the price for which he can secure foreign ware for the same end use. The low-priced imported foreign ware keeps a continual pressure on the market, and prices are forced down to a non-profit basis, and often below cost in United States factories selling both non trade marked and ultimately trade marked merchandise. One might say, they should not take this business—but their money is invested in their plants and, in order to keep running, they continue to cut price corners in the hope that better conditions in the future will again restore fair prices.

Such has been the case during the war period, starting in 1941 to the present. These factories, without imports to depress the market, have stopped taking this low-priced business and now are returning to a healthy financial position. They have not inflated their prices for OPA has controlled them. Their present healthy condition is due primarily to the lessening price-pressure of low-priced foreign competition plus the opportunity of recapturing the 20 per cent or more of the United States consumption which, heretofore, was imported from foreign manufacturers.

The hand-made glassware industry admittedly is small in volume as compared with the great metal fabricating and textile industries which consume huge quantities of raw materials and provide large payrolls. However, hand-made glass, and many other hand industries such as pottery, chinaware, lace, toys, hats, needlework and others, employ in the aggregate a large number of people. Their combined payroll is a distinct contribution to the basic prosperity of the country. Many of these hand industries are located in small communities which, if it were not for the local hand plant, could not prosper.

These hand-made industries, in proportion to their size, contribute in normal times to the prosperity of this country in wage dollars per person a far greater percentage of their sales volume than many of the larger industries. United States prosperity results when people are employed at fair wages which leaves them a little extra money in their pockets to be spent above the mere necessities of life. There are more payroll dollars in hand-made glass sales than in the equal sales volume of many "big business" products.

This payroll factor seems not to be considered when trade agreements are made. Apparently the dollar value of the finished product forms the basis of our trade bargaining with other countries, e.g., $1,000,000 of exported United States automobiles would be balanced by $1,000,000 of imported glassware. The foreign hand-made glassware sold in this country displaces an equal amount of United States hand-made glassware production. For instance, the payroll balance for the trade perhaps would be $150,000 increased wages for United States automobile workers and $600,000 less wages for United States glass workers — the loss: $450,000 in United States overall wages. We would have to sell a $4,000,000 volume of automobiles, or four to one, to equal the same payroll dollar return to workers in this country.

More attention should be paid to the payroll content in the volume of articles which are bargained in trade agreements or, ultimately, we shall fritter away our great natural material resources without having made use of them to create continued future prosperity in larger dollar payrolls to United States workers for fabricating them. It is dollars paid in wages to United States workers which make prosperity in this country. The hand-made industries are a very important factor in the United States economic process.

Trade agreements tend to eliminate hand manufacturing industries because foreign manufacturers sell their low-priced hand labor products in direct competion with United States high wage scale hand labor products in the United States market where selling prices necessarily must be maintained at levels high enough to support the higher wage scale paid United States workers. Many hand workers eventually will also be eliminated if trade agreements are made without thought of this phase of their effect. It is erroneously stated that these workers will be employed in the machine industries. This has not been the case in the hand-made glassware industry as they have formed cooperative factories where, in pre-war times, they worked at very low wages in order to meet low-priced, foreign competition. If later hand workers become machine operators, then we, as a national people, will become "robot" parts of machines, and the artisans now employed in our hand-made industries will disappear; "freedom of choice of work" is limited, for there is nothing left to do but "learn to run a machine."

There are many people who have artistic talent and yearn to work with their hands. They do not want to work on a machine; they are unhappy when they must do it. When legislation is enacted which drives such people into machine production when they really want to produce hand-made products, they become unhappy and dissatisfied. Trade agreements lowering tariffs on hand-made products make it impossible for these articles to be sold profitably in a market continually depressed by the low-wage scale products of foreign countries. Our hand workmen must then accept the low living standards of foreign countries and we, as a nation, lose the arts and become the drab machine shop for the world.

The importance of maintaining hand-made industries as a source for producing precision instruments, optical goods, and light accessories for war materials should not be overlooked. The dexterity of hand workers in peacetime in our handcraft factories has been a great asset to this country during the present war. The glass industry has provided large quantities of hand-made (and they must be) specialized radio and radar tubes, glass gauges, and many unusual glass parts and accessories for control and optical instruments. Emphasizing the importance of articles produced by hand, it can be stated further that not only glass but many other hand working industries have contributed greatly to the war effort and are essential in producing articles necessary to our future requirements for national defense.

(*Continued on page* 89)

INVENTIONS AND INVENTORS

A Summary of United States Patents of Interest to the Glass Industry Issued During December

Feeding, Forming and Shaping

Past issues of THE GLASS INDUSTRY have described the methods and apparatus used by Paul R. Luertzing of Vineland, N. J., in forming tubular containers designed for receiving closures on both ends. These represent developments of his idea for charging a gob to a horizontal cylindrical mold and then rotating it at such a speed as to cause the glass to flow by centrifugal force over the mold surface and to take the desired shape. To the earlier patents 2,349,046 and 2,350,052 another has been added (2,366,118) which provides for supplementing the centrifugal forming action with a roller, which, inserted into the cylinder, presses against the glass to reduce the wall thickness. The roller may serve to form a groove within the cylinder for receiving a cap.

Figs. 1 to 3 from patent 2,365,955 assigned to Corning Glass Works by Ray A. Hinkley and Robert L. Meikle show their apparatus for holding a mold support level and rigid while an article is being pressed, and also while the pressing plunger is being withdrawn from the mold. Presses commonly in use, to which the invention may be applied, include a circular table mounted for rotation about a vertical axis and carrying a series of press molds about its periphery which are successively indexed beneath a pressing plunger after the receipt of a mold charge. The mold table employed usually comprises a heavy casting loosely supported at its center in a substantially level position. To ensure that the table will remain level during the downward thrust of the pressing plunger, an anvil is often arranged adjacent the under side of the table at the pressing position. While it takes the thrust there is objectional wear on the table and if the anvil fails to contact the table the latter may be warped by the lack of support.

To understand the improvements introduced by Hinkley and Meikle note the plunger at the top of Fig. 1 which is preparing to enter a mold to form a glass dish. Immediately under the mold is an anvil 15 which will first be brought into contact with the table; this is accomplished by an air piston shown in Fig. 3 which moves forward a wedge 16 to force the anvil upwards. To prevent warping of the table and to hold the table while the plunger is being withdrawn, table hold-down units 25 and 26 (Fig. 1) are provided. As shown in Fig. 2 these are air-piston units capped with washers 30 which may be drawn downward into contact with bolt-heads 31 mounted on the table rim. The table is thus kept tightly clamped against vertical movement while the pressing is proceeding.

Edwin E. Slick of Pittsburgh received patent 2,366,066 for a bottle blowing machine in which blow or finishing molds move about a vertical axis, with a gathering or parison mold immediately below each, and with controlling means which allow each pair of blow molds and parison molds to dip so that the latter may pick up a charge of glass by suction. The blank is then lifted from the parison mold to the overlying blow mold for finishing. This invention is related to that disclosed in an earlier patent 2,278,572.

Patent 2,364,673 granted to Wm. P. Stuckert and Harold H. Snyder of Sylvania Electric Products Inc. covers a machine for forming necks on the ends of glass tubes to be used for fluorescent lamps. It distinguishes from earlier machines which rotate the tubes against the burners, by instead holding the tubes fixed while rotating the burners. After the ends have been softened by this heat, necking rollers are applied to do the shaping. A disadvantage claimed for the earlier method was that any apparatus which rotated the tube might allow it to move longitudinally.

Modifications applicable to the Owens type suction gathering machine for forming bottles are described in patent 2,365,929 (Fig. 4) assigned to Owens-Illinois Glass Co. by Russell G. Allen and Charles B. Smith of Alton, Illinois. In machines of this type, suction gathering molds are carried on dip heads mounted on a horizontally rotating carriage by which the dip frames are brought in succession over a tank or pool of molten glass. Each dip head in turn is lowered to dip the mold

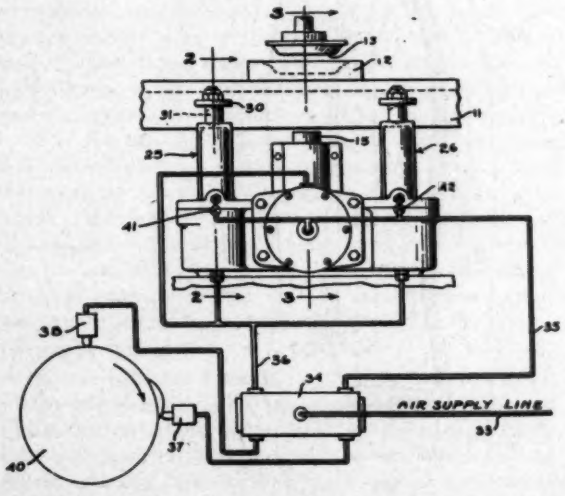


Fig. 1.

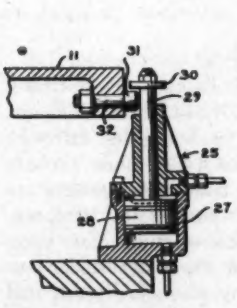


Fig. 2.

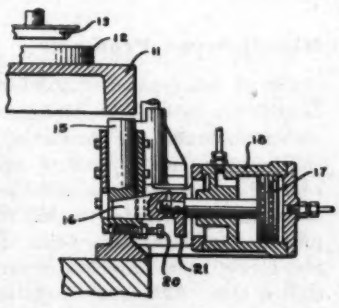


Fig. 3.

Figs. 1 to 3. 2,365,955 : Hinkley and Meikle. Pressing table with anvil to take the load of the plunger. Fig. 2 shows a device for holding down the table, and Fig. 3 indicates how anvil 15 may be applied to support the mold.

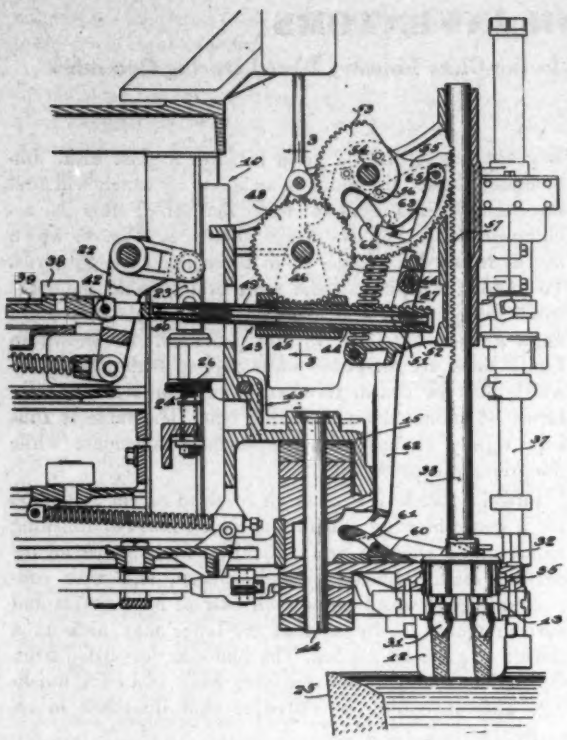


Fig. 4. 2,365,929 : Allen and Smith. Cam and gear control apparatus for controlling the movement of plungers into blank molds of Owens type forming machines.

into the pool and charges of glass are drawn by suction into the mold cavities. Associated with each mold is a vertical plunger having a tip or neck pin which when the plunger is lowered, enters the neck mold and in cooperation with it forms the neck portion of the bottle which is later blown to final form within a finishing mold. The invention relates mainly to the apparatus for lifting and lowering the plungers and for reliably holding them in the lowered position. The combination of gears and racks by which this is accomplished is shown in Fig. 4, of which only the main elements will be discernible without first-hand study of the patent.

Allen received a second patent, 2,365,928, also assigned to Owens-Illinois, which concerns means of mounting the finishing molds in an Owens type machine so that they may be removed from the machine easily and quickly and replaced by other molds without stopping the machine.

Miscellaneous Processes

Fig. 5 from patent 2,365,138 assigned to Hartford-Empire Co. by Chas. E. Mongan, Jr., of Hartford, Conn., shows apparatus for tempering a bottle by directing chilling gas under pressure against its inner surface, when the latter is at a suitable tempering temperature above the strain point to chill the surface to a temperature below the strain point, the escaping gas upon emergence being directed against the outer surface to chill it also. Although the chilling gas, usually air, will be hotter when it reaches the outside of the bottle, Mongan reports that the result is generally to give both the inside and outside similar compressive stresses since the difference in temperature of the air is compensated for by the difference in natural conditions which exist within and without and which affect the rate of cooling. Mongan's invention dispenses with external cooling blowers.

Apparatus for coating glass tubes with luminescent material is described in patent 2,364,798 assigned to Sylvania Electric Products Inc. by A. E. Kuhlberg and Chas. L. Albright of Beverly, Mass.

Bernard Long of Paris received and assigned to The American Securit Co. patent 2,365,967, which seems to have some fairly broad claims covering the differential tempering of sheet glass. For example, the first claim is for "The method of tempering glass sheets or plates

(*Continued on page 96*)

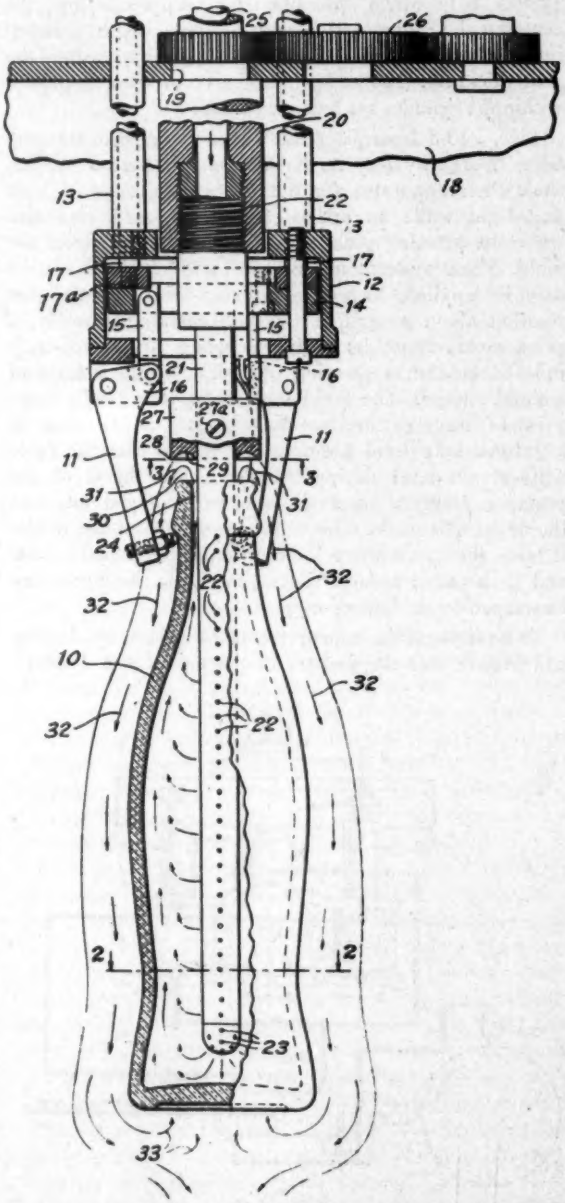


Fig. 5. 2,365,138 : Mongan. Tempering apparatus which receives the cooling air from the inside of the bottle and recirculates it over the outside.

GJ Research Digest

Practical Interpretations of Glass Technology

Refined Method of Control of Cordiness and Workability of Glass During Production (Statistical Control Charts Applied to Daily Measurements of Density)

Statistical control charts (quality control) have proven quite useful in other fields and some attempts have been made to adopt the technique to the glass making field. As the practice of measuring the density of the glass on a daily basis is quite common in the industry, Ghering (*Journal of the American Ceramic Society*, Dec., 1944), has applied the method to such measurements.

In Ghering's work, the control-chart method of statistical analysis of past data was applied to data obtained from ten glass furnaces and it was found that small daily fluctuations of density are statistical in charater and that the predominate cause of large variations is to be found in the batch house. The rational sub-group sample that gave the best results was found to be a sub-group of three consecutive daily density values obtained from the furnace under study. Using such a sub-group, the average three-day range of density for the ten furnaces studied was found to vary from 0.0006 to 0.0023, and the corresponding 3-sigma limits for daily variation from the central line density were $\pm$ 0.0011 to $\pm$ 0.0040. A typical value for the average three-day range of density was stated to be in the order of 0.0012. This figure was recommended as a reasonable goal for a glass container plant.

The use of control charts for maintaining a state of statistical control of density during production was illustrated for four furnaces over a two to six-month period. Those points which plotted outside of the control limits were taken as an indication of an assignable cause. Assignable causes were located and were found to be due to 1 — batch house scales in error, 2 — cullet changes, 3 — changes in the raw materials, 4 — changes in furnace firing, and 5 — laboratory errors in the measurement of the density. This work also indicated that it is difficult to maintain a state of statistical control with the types of batch-weighing equipment in use in some plants. The importance of endeavoring to keep the process under control was demonstrated as it was shown that in one plant, cordiness increased with increasing three-day range of density while in another plant trouble was experienced with checks in the ware when the process was out of control.

The use of control charts for keeping lack of control within tolerable limits was discussed for one furnace in which the variations were small and the control limits were narrow. The range was held under control, but the density showed "trends" and went out of control. In this instance, the 3-sigma control limits for variation of daily values from the central line density were $\pm$ 0.0011 which corresponds to a $\pm$ 0.09% replacement of lime by silica. Inasmuch as composition changes in excess of $\pm$ 0.09% are tolerable in the present state of the art, a modified control limit corresponding to a composition change of approximately $\pm$ 0.25% is suggested, the corresponding density limits being $\pm$ 0.0030. When the 3-sigma limits for density are less than this value, modified limits may be used, although the 3-sigma limits for range are retained. When the 3-sigma limits are greater than $\pm$ 0.0030, it is most desirable to maintain strict statistical control, and efforts should be made to reduce the variability; otherwise there may be excessive cordiness and other difficulties in fabrication of the ware. In some instances, a reduction in variability will require major repair of batch handling and weighing equipment or a new batch-house weighing installation as it has been this phase of the operation that has been found responsible for the bulk of the large assignable causes.

This work indicates that control charts on density are of practical utility to glass plants. In the first place, the density measurement itself can be made rather easily, quickly and accurately. In the second place the control chart technique is not difficult and does not require higher mathematics. In the control chart itself, assignable cause variations are very easily distinguished from unimportant, normal variations. The use of 3-sigma action limits keeps investigations of fluctuations to a minimum, and sets trouble-shooting, when it is necessary, on the right tract. The charts, furthermore, are a useful guide toward a permanent reduction of the variability. They should be helpful to management in striking an economic balance among tonnage pulled, glass quality, and capital expenditures for improvement of batch mixing and handling and other changes. It is estimated that the time required to maintain a chart for one furnace is about one day for past-data analysis, one minute each day for plotting, and not more than one day per month for current analysis, review and adjustment.

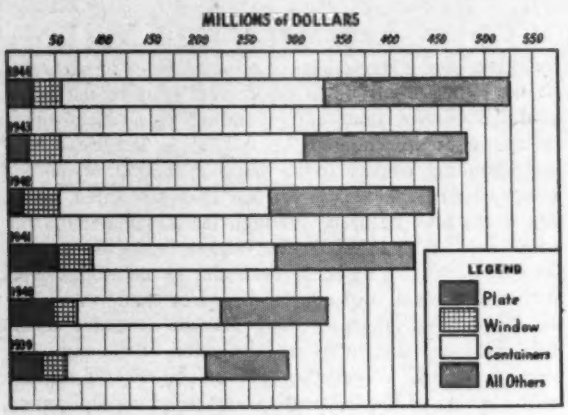
Analysis of Batch for Separation

In tracking down the causes of cord or other glass defects one of the first steps that is usually taken is to check the batch for segregation or poor mixing. Hunt (*Journal American Ceramic Society*, Oct., 1944) has studied this subject and discusses some of the factors that influence the accuracy of tests for segregation in glass batches. Thre three important factors are: 1— size of sample, 2—effect of cullet, and 3—comparison with a miniature batch. Hunt gives recommendations as to the optimum sample size, describes methods for correcting for the presence of cullet in the sample and discusses the use of a standard miniature batch. The original paper should be read by those interested in this subject.

CURRENT STATISTICAL POSITION OF GLASS

GI THE GLASS INDUSTRY'S INDEX

Production Eleven Months, January Through November



Activity in the glass industry during November was shown at the same level as that for October. As reported by the Production Index, production for November was $48,000,000, the same as production during October. This compares to $47,000,000 for November, 1943. Output for the first eleven months of 1944 was $524,000,000, comparing with $487,000,000 for the same period of 1943—an increase of slightly more than 7 per cent.

Plate glass production for the month of December was 7,012,983 sq. ft., as reported by the Hughes Statistical Bureau. This is about an 8 per cent decrease from the figure reported for November, and about a 9 per cent decrease from December of 1943. A total of 101,937,701 sq. ft. was produced during the twelve months of 1944 as compared to 74,770,310 sq. ft. reported for the year 1943—an increase of a little more than 36 per cent.

Glass container production for December was reported at 7,667,404 gross, by the Glass Container Association of America. This is a decrease of 3 per cent from the figure shown for November, and approximately the same figure as that shown for December, 1943. During the year 1944 glass container production was shown at 99,726,927 gross, as compared to 92,706,953 gross for the year 1943—an increase of around 7 per cent.

Shipments of glass containers during December totalled 7,389,949 gross, a decrease of 5 per cent from November and of 4 per cent from December of 1943. Total shipments reported for the year of 1944 were 96,385,087 gross—an increase of about 1½ per cent over shipments made in 1943.

Inventories on glass containers for December were 5,059,987 gross, a decrease of 5 per cent from November and an increase of 15 per cent over December of 1943.

Automatic tumbler production for December totalled 4,656,671 dozens, slightly less than shown for November and an increase of 5 per cent over December of the preceding year. Shipments of automatic tumblers for the month of December were 4,605,558 dozens, a 2 per cent increase over the November shipments and also a 2 per cent increase over the December, 1943, shipments. Finished stocks on hand at the end of 1944 were reported at 7,384,956 dozens.

Table, kitchen and household glassware: Manufacturers' sales of machine-made table, kitchen and household glassware for December were reported at 2,900,860 dozens, a decrease of 11 per cent from the figure shown for November and an increase of 43 per cent over December, 1943.

Miscellaneous glass products manufactured in November were estimated at $17,000,000—the same as that reported for October. This compares with $18,000,000 reported for November of 1943.

GLASS CONTAINER PRODUCTION AND INVENTORY

(All Figures Are in Gross)

		Production Dec. 1944	*Stocks Dec.* 1944
Foods; Medical & Health Supplies; Chemical, Household, Industrials; Toiletries & Cosmetics	Narrow Neck	2,284,944	1,971,262
	Wide Mouth	2,635,000	1,509,086
Dairy Products		243,682	316,136
Home Canning		71,605	390,320
Beverages		552,012	327,063
Beers		930,979	158,919
Liquors		692,641	317,796
Wines		197,840	89,697
Packers' Tumblers		58,701	16,375
Total		7,667,404	5,059,987

GLASS CONTAINER SHIPMENTS

(All Figures Are in Gross)

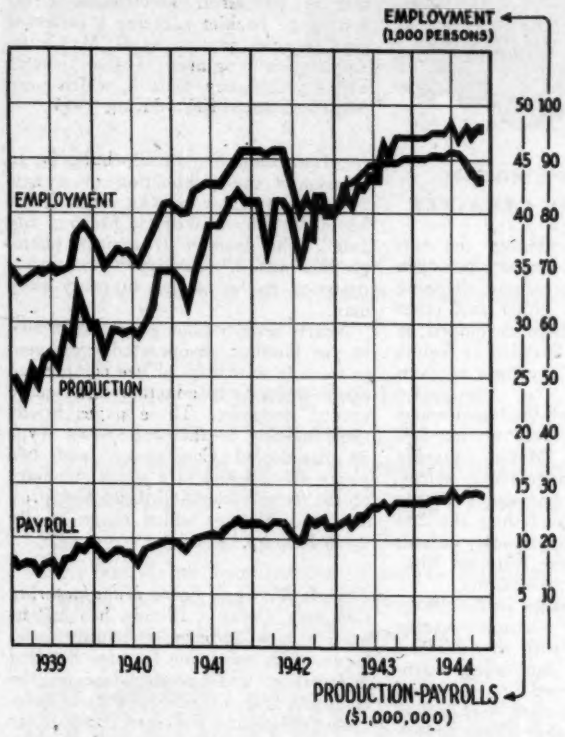
	Dec. 1944
Narrow Neck Containers	
Foods	475,872
Medicinal & Health Supplies	796,816
Chemical, Household & Industrial	486,305
Beverages	457,180
Beers	918,840
Liquors	670,778
Wines	195,033
Toiletries & Cosmetics	391,524
Sub-Total (Narrow Neck)	4,392,348
Wide Mouth Containers	
Foods	2,199,785
Dairy Products	266,175
Home Canning	29,099
Medicinal & Health Supplies	236,253
Chemical, Household & Industrial	99,865
Toiletries & Cosmetics	120,678
Packers' Tumblers	45,746
Sub-Total (Wide Mouth)	2,997,601
Total Shipments	7,389,949

Employment and payrolls: The total number of persons employed in the glass industry during November were 87,100. This is the same number as were employed in October and compares with 91,000 employed during November, 1943.

Payrolls for November were estimated at $14,500,000 as compared with $14,750,000 paid in October. During the first eleven months of 1944 glass manufacturers paid approximately $156,250,000 in salaries.

GI THE GLASS INDUSTRY'S INDEX

Monthly Trends Through November, 1944



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NEW EQUIPMENT AND SUPPLIES

HIGH WEIGHING CAPACITY AND LOW DIAL GRADUATIONS IN KRON SCALES

The KRON Unit Weight Cabinet attachment made by the Yale & Towne Mfg. Co., Philadelphia, answers industrial requirements for a high gross weighing capacity scale with low and accurate "fractional" weight dial chart graduations. This scale is equipped with the standard KRON dial mechanism, swivel head, tare and capacity beams and drop weights to provide the greatest gross platform capacity of any scale of its type.

The unit weight increment principle around which this scale is designed is simple and fool-proof. By rotating the handle on the left of the cabinet front, from 1 to 7 unit weight increments, each equivalent to the dial chart capacity, can be added to the lever system to increase the gross weighing capacity of the scale. The weight increments are indicated in a target on the dial chart as they are added to the lever system. Flexible cables connecting this target to the drop weight mechanism allow the dial head to swivel to any desired position.

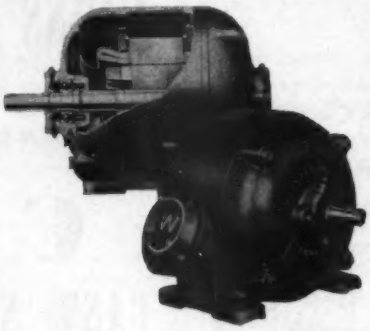
The outstanding advantage of the KRON Unit Weight Cabinet Scale to users requiring a high gross weighing capacity combined with accurate "fractional" weight readings is the ease, simplicity and precision with which the gross weighing capacity of this scale can be increased as much as nine times for heavy-duty service, while still retaining low dial chart graduations.

AUTOMATIC CASE NUMBERERS

Adolph Gottscho, Inc., New York City, has announced information about its improved marking device—the Automatic Case Numberer. Since this device uses a rubber faced figure it can imprint large, legible figures on rough wooden cases, corrugated cartons and even on the shipping papers themselves. For this reason in many instances plants use this machine to imprint in duplicate by serial numbering their cases and then imprinting the shipping papers.

Many plants have made use of special models of these machines. One of these special assemblies has now been made standard. It consists of seven wheels which imprint three digits, word "OF" and then three more digits. The first group of three digits will change consecutively or in duplicate with each impression to show the case number; the last three digits are set by hand and remain unchanged, indicating the total number of cases to be shipped.

These Automatic Case Numberers are available in the regular numbering set-ups for straight serial numbering or lot numbering of cases. Or they may be procured in the special models outlined above. In either case, they may be furnished in three different character sizes 1 in., ¾ in., and ½ in.



PROTECTED TYPE MOTOR HAS OPEN MOTOR CAPACITY

A new motor, combining the surplus capacity of the conventional open motor with protection against dripping liquid, falling metal chips and other foreign matter, has been developed by the Crocker-Wheeler Division of Joshua Hendy Iron Works at Ampere, New Jersey.

Rated 40 C rise, full-load continuous duty, with a 15 per cent service factor, Protected-Type Motors provide added protection at open motor prices. At present, these motors are available in sizes up to and including the 284 frame. Mounting dimensions conform to the standards of the National Electrical Manufacturers Association.

There are no openings in the frame or shields above the horizontal center line. This, together with the shielded construction of the ventilating openings, makes Protected-Type Motors suitable for machine tool and similar applications where other types of enclosures have been required in the past.

Centrifugal seals permit use of softer grease for better lubrication and longer bearing life. The Company's ALUCAST rotor construction, in which the bars, fans and end rings are cast in one operation from aluminum alloys, is employed.

Other features of these many-purpose motors include: heavy cast frame construction, coils protected by Vinyl Acetal insulation, interchangeable front and rear shields, and specially designed guides for directing cooling air over all surfaces.

CATALOGUES RECEIVED

The Askania Regulator Company, Chicago, Illinois, has issued a new bulletin (No. 122) discussing the how and why of heating furnace control.

The effects of furnace pressure and atmosphere on economy, equality and scale formation are treated in detail.

The Peabody Engineering Corp., New York City, has just published Bulletin No. 902, describing the Peabody Type M Gas Burner and the Combined Gas and Oil Burner.

It describes and illustrates the mechanical and operating features of these burners, for natural or forced draft operation, and also shows the types of atomizers used for oil firing.

General Electric Co., Schenectady, New York, has for distribution a publication (GEA-4309) entitled "Fundamentals of Industrial Electronics." This forty-page booklet contains a series of eight articles written by G. M. Chute, Application Engineer of the General Electric Company, Detroit, which were published in *STEEL* during 1944.

Ingersoll-Rand Co., Phillipsburg, N. J., announces the publication of a new 24-page, two-color booklet entitled, "A Little Air Power Will Do Many a Big Job." The booklet is mainly photographic with a minimum of text and is designed to be of use to every shop man.

Nearly seventy photographs show how to put familiar air-operated equipment to work in new ways or use compressed air to increase production and secure greater economy. Three pages briefly show models of the well-known Type 30 Air-Cooled Compressor, and two pages are devoted to a quick summary of the larger Ingersoll-Rand Compressors and Blowers which range in size up to 3000 hp.

The A. W. Cash Valve Manufacturing Company, Decatur, Illinois, has just issued a new 28-page descriptive catalogue. This catalogue features detailed information and specific data on the complete line of CASH-ACME Automatic Valves and Pressure Controls for use with water, air, steam and oil. The company states that production facilities are geared to make prompt shipment of the CASH-ACME Valves and Pressure Controls illustrated. ....

Leeds & Northrup Co., Philadelphia, Pa., has just released a 25-page booklet "Micromax Electric Control—Duration-Adjusting Type." This booklet describes their system designed especially to bring to electrically-heated units a regulation of heat-input.

CATALOGUE & BULLETIN SERVICE

Current catalogues and manufacturers' service bulletins reviewed in this department may be obtained by writing to THE GLASS INDUSTRY.

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- 431 **dag** colloidal graphite for IMPREGNATION AND SURFACE COATINGS
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(Lubricants containing **dag** colloidal graphite are available from major oil companies.)

FURNACE OPERATION AND CONTROL . . .
(*Continued from page* 77)

unmelted batch pile, at any rate recognizable as such, should be allowed to pass beyond the line which corresponds with the hot spot. Whether this is because that point is the "hot spot," or whether it is because the point represents the minimum allowable residence time between it and the throat for suitable diffusion following melting is open to discussion. However, we have had to change our ideas regarding the foam line itself.

The furnace represented by the temperature curve of Fig. 4 is a case in point. In its first fire this furnace always showed a clean-cut foam line with a mirror-like surface beyond. For rates of pull up to about 110 tons the foam blanket was still retained back of the point of maximum temperature (between the 2nd and 3rd ports). At higher tonnage the foam line did creep over and beyond the furnace "hot spot" to about the edge of the 4th port—still retaining its sharpness and clarity beyond. However, in its second fire the refractory flux blocks were changed to a material much more dense and of higher conductivity. This itme the foam-line never became sharply defined. In fact at the high pull of 4.6 sq. ft./ton of glass represented by Fig. 4 the foam which appears to be nothing more than accumulated gas bubbles reaches clear to the bridgewall.

Further, it was found that the position of the foam was a function of the amount of cooling "wind" directed against the sidewall blocks. By reducing the air volume on one side of the furnace, the foam could be drawn back on that side to re-form a ragged line running diagonally across the furnace. The same could be done on the other side. As the cooling air was put back on, this foam moved down to its original position. Probably this is a "reboil" effect caused by sharp cooling of surface glass in the vicinity of the sidewall while still under exposure to the furnace atmosphere. Under natural convection this glass undoubtedly sinks and is drawn out toward the center of the furnace where as it heats it begins to rise and liberate an incremental amount of gas from solution.

At any rate this foam phenomenon does not interfere with the melting performance. This furnace happens to be connected up with a fully automatic batch plant and the cord rating on the furnace will run at 6 sq. ft./ton just about a straight A—(on Swicker's scale of rating) —with only the faintest trace of inhomogeneity. At 4.6 sq. ft. this rating will have depreciated only slightly to about B on the same scale, with the seed rating showing about the same relative effect.

Under what the writer considers optimum proven performance, as indicated in the foregoing discussion, the "hot spot" in the furnace exists at a level from 50 to 75 deg. F. above the bridgewall, at a point just beyond the 2nd port for a 4 port furnace and just beyond the

(*Continued on page* 92)

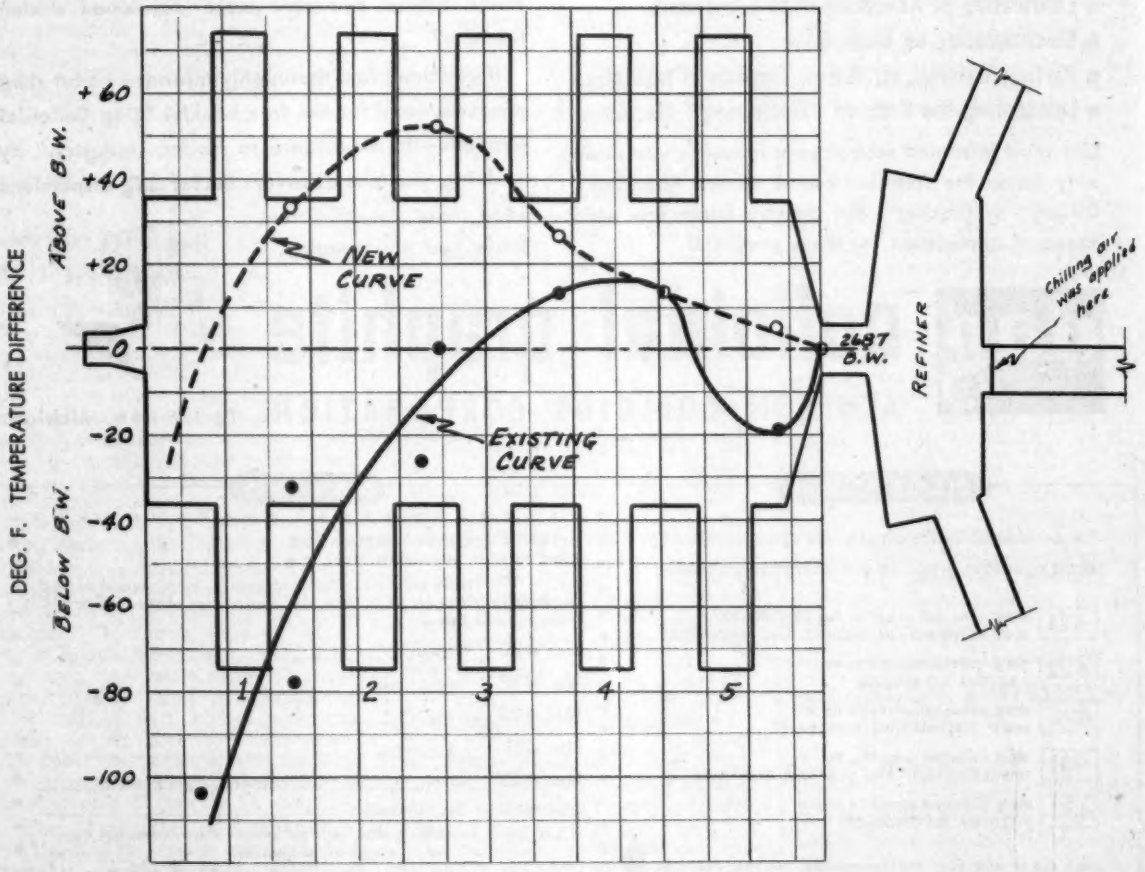

Fig. 6.

TARIFF PROTECTION FOR U.S. GLASSWARE . . .

(*Continued from page* 80)

In most discussions concerning foreign trade and trade agreements, the large dollar volume of merchandise which now enters our country free from import duty under the Tariff Act of 1930 is not generally realized. This volume is shown by the following tabulation of United States imports for consumption. Less than 40 per cent of our imports can be affected by trade agreements since a large percentage already comes in without duty. Does it seem probable that tariff reduction on this small percentage is as important to the future prosperity of this country as many proponents of trade agreements want us to believe?

TOTAL IMPORTS FOR CONSUMPTION

Year	*Duty Free*	*Subject to Duty*	*Total*
	(In Thousands of Dollars)		
1937	$1,765,247	$1,244,605	$3,009,852
	58.60%	41.40%	100.00%
1938	1,182,696	766,929	1,949,625
	60.66%	39.34%	100.00%
1939	1,397,280	878,819	2,276,099
	61.39%	38.61%	100.00%
1940	1,648,965	891,691	2,540,656
	64.90%	35.10%	100.00%
1941	2,030,919	1,191,035	3,221,954
	63.03%	36.97%	100.00%

The total dollars levied in duties on imports in 1941 (the largest total imports during recent years) was $437,750,000—which is 36.75 per cent on dutiable imports and 13.59 per cent on total imports. The most trade agreements can cut this is 50 per cent; therefore, what actually is stated is that $218,875,000 is the big turning point as to whether or not our foreign trade will be successful. This hardly seems possible.

It often is stated that trade agreements must be made so that tariffs can be reduced in order to build up imports and increase export trade through dollar balances created in this country. During the period 1934 to date, at least 1,100 tariff reductions have been made to all most favored nations by trade agreements. The percentage of imports subject to duty has decreased and, in 1941, under European war conditions, the total imports were only slightly above 1937.

As shown by the following table, exports have remained fairly constant except for the year 1941 when export volume was inflated by the impending world war.

TOTAL EXPORTS OF U. S. DOMESTIC MERCHANDISE
(In Thousands of Dollars)

1937	—	$3,298,929
1938	—	3,057,169
1939	—	3,123,343
1940	—	3,934,181
1941	—	5,019,877

It is rather difficult to see just wherein the trade agreements program has accomplished its objective except to cut tariffs since exports under normal conditions have not shown the much anticipated increase.

Hand-made illuminating, table, and ornamental glassware manufacturers have no opportunity of increasing their export trade because foreign prices, due to low wages, deny it to them. Foreign hand-made glassware manufacturers undersell the United States made ware even in the United States under the tariff rates of 1930. How, then, can the same United States ware sell in world markets under highly competitive conditions when United States manufacturers cannot compete with these prices even in their own country? There is no relief for this section of the glassware industry in foreign trade to offset loss in volume in United States markets due to imports.

Most factories producing hand-made glassware, and in fact almost all other hand-made goods, are fabricated in small production units employing from 50 to 500 people, usually located in a small town or community. There are many of these small industry units scattered throughout the United States. Congress now recognizes that small industry on "Main Street" is the backbone of the economic and social life of this country.

Small companies usually do not develop foreign markets and conduct trade with them; that costs too much. They get little foreign business and, generally, are in the same position as the hand-made glassware industry in that their products, due to higher American wages, cannot compete in world markets with the low-priced foreign goods. Congress makes substantial appropriations to encourage small businessmen and keep them in business. Then it passes trade agreement legislation which limits a large portion of this small business group because it cuts the volume sale of hand-made articles in the United States market by encouraging imports which compete at reduced prices. This doesn't make sense—on one hand to spend money to stimulate small business, and on the other to pass legislation which depresses profits and lessens the market for its products.

The time has arrived when Congress must make a decision—whether it will sacrifice the livelihood of the workers of this country engaged in hand production, reducing them to the low-living standard of the small wage paying foreign countries, or if the trade agreements program will be safeguarded by adequate legislation to assure the continued existence of hand-made manufactured articles made in United States factories by workers living under desirable United States standards.

We fast are learning that we cannot regulate living standards in foreign countries even after the present war when those involved have been liberated. We are on record as not wishing to dictate in any way other nations' domestic or foreign trade policies. It is evident that the United States can not be certain of what other nations are going to do. Why, then, gamble the reasonably large volume of business in hand-made manufactured goods which we now have for the uncertainty of junking this business to nations which are nationalistic in their foreign policies. To do so is to risk the successful accomplishment of 155 years of progress made in the handcraft industries under an adequate tariff system.

Congress now is confronted with the necessity of deciding whether or not the Trade Agreements Act will be renewed after June 12, 1945. All phases of the Act should be studied very carefully as the people of this country are looking to their congressmen, as never before, for wise guidance and enactment of legislation which will achieve a lasting, successful and well balanced future national economy.

Fig. 8

to be in tension.

All the samples show hackle-marks in the central region and indications are that the fractures originated in the center of the strip even though the physical shock was applied to the upper surface. There is no conclusive evidence to substantiate these indications. The fracture may have actually originated on the surface of the glass in which case the marks would probably indicate the conditions of permanent strain and compression introduced in the glass during tempering.

Fig. 6 shows two miscellaneous breaks which are of interest.

(a) The lower side of the strip was marked with a diamond and the upper side taped with a hammer at points X. The fracture passed from right to left with tension on the lower side. The diamond mark breaks the lower surface and aids in placing tension on the lower side thus directing the fracture.

(b) The fracture originated at point O and progressed slowly to the distinctly outlined rib-mark ab. The rupture then continued slowly to the rib-mark AB. Here it remained steady until broken by a severe blow as indicated by the hackle-marks.

In Fig. 7 are shown two miscellaneous fractures taken from pot glass. (a) is an example showing clearly the hackle-marks at right angles to the rib-marks. In (b) the rib-marks are symmetrical about the point at which the physical shock was applied. It is a typical sample of a break which the operator designated as being made "with the grain." Only a slight tap of the hammer is needed.

When fractured "against the grain" the break appears as shown in Fig. 8. The chunk of glass was struck severe blows several times before fracturing into the pattern shown. Considerable irregularity is present also in the plane perpendicular to the plane of the photograph.

PERISCOPE PRISM OUTPUT TOPS MILLION

The Libbey-Owens-Ford Glass Company has disclosed that more than one million precision prisms for tank periscope sights were produced in 1944. Production during 1943 totalled 275,000.

Application of mass production methods used in making plate glass to the manufacture of prisms with high optical properties and development of rapid inspection machines made the high output possible.

The prisms are made in 36-inch lengths, then cut to desired sizes. A slow annealing process, necessary to secure proper optical qualities in the glass, is so closely controlled that heat is lowered only five degrees every sixteen hours. Temperature of the furnace, converted for the special annealing job, is measured at ten different points every fifteen minutes. Seventeen tons of prism "strips" are "treated" at one time in the furnace.

WASHINGTON GLASS UNIT CHANGES LOCATION

The Glass Unit of Chemicals Bureau, War Production Board, has moved to Temporary "E" Building in Washington. It was formerly located in the Temporary "S" Building. Mr. Thomas H. Tremearne continues as chief of the Glass Unit.

All offices of the Chemicals Bureau, including sodium nitrate, soda ash, and potassium derivatives are now located in Temporary "E" Building.

• General Preference Order M-62, which controlled sodium nitrate, was revoked December 26, 1944. Sodium nitrate is now governed by Schedule 80 to General Allocation Order M-300. It is the considered opinion that the control of sodium nitrate is much lessened insofar as glass manufacturing is concerned.

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(*Continued from page* 88)

3rd port in a 5 port furnace (approximately 45-55 per cent of the melter length depending on port spacing. The exact elevation that this point takes hinges to some extent upon the condition of the checkers and of course the rate of pull on the furnace as already mentioned. Actually we may as well acknowledge that it is not absolutely essential that this "hot spot" hump be pronounced. On some furnaces especially where the ports are all of equal size, there is more tendency to develop a uniform temperature level beyond the mid-point of the furnace; which is enhanced further in the furnace life by a partially plugged condition in the checkers under the first two ports and high furnace pressure. The temperature fall from what is normally the "hot spot" to the bridgewall has run in these cases almost negligible —almost a horizontal line. At the same time the visible conditions within the melter are normal, with the overall temperature level high enough to cause all batch piles to disappear at the proper point, and usually showing a sharply defined foam-line besides.

Conversely, in other furnaces, wherein the port or ports closest to the bridgewall are too small, the hot spot has a tendency to run at an elevation too high above the bridgewall—as much as 160 deg. F. The appearance within the melter again is normal, provided the temperature level is high enough. Absolute proof that either of these conditions has downright harmful effect is found to be obscured in the usual assortment of glass house variables. However, from experience, I would say that the last condition is the least desirable of the three.

The "Hot Spot" and Cordy Glass

At any rate this much *is* definite: Viz.,—that it is a dangerous condition to have the hottest point in the furnace down at the bridgewall end. One classic example of this, learned the hard way several years ago, is shown in Fig. 6. This furnace a few months along in its campaign, developed a streak of lumpy glass in the center feeder which would begin as a thin hair-line at 8:00 P. M. on Thursday night almost on the dot and gradually increase in breadth until by the following Saturday it had become a heavy, lumpy streak in the wall of the bottle—about the size of a lead pencil. On the other hand, the other two feeders, both of which were pulling heavier tonnage, were having very good glass of about B rating. In fact one of them set a new production record on one of these days. Apparently the center feeder, called "The Hinky Dink" (the furnace: "Hinky Dink's Mother"), was acting as the scavenger for the other two.

On the following Sunday, at which time the furnace was regularly idle, this cord of course would diffuse into the melt and leave no traces by the time of the Monday morning start-up. In fact, as was proved later, about 12 hours idle time was sufficient time for the absorption. Everything looked all clear and of course there was hope, the same in every glass house, that it would go away and not come back again. But again on Thursday night at 8:00 P. M. our "friend" the "hair line" showed up.

We sawed parisons and looked at samples collected hourly leading right up to the corpus delecti. On the supposition that there must be some abnormal bottom movement of glass in the neighborhood of the throat or refiner (as you can see we were trying to make it as hard as possible), we measured bottom surface temperatures hourly all over the furnace—finding as many different temperatures as there were blocks. We also put large quantities af cooling wind at various points, in the vicinity of the throat, hoping to slow down the sloughing off of stagnant glass into the main stream. If there was any effect here it was not noticeable. Fortunately the throat was just a plain ordinary throat so we could not blame it on the throat.

Actually even though the cord in its full bloom was a heavy looking thing, the sawed parisons of course showed it as only a fine filament of viscous glass which of course did not blow out evenly in the bottle, giving the appearance of a heavy cord, whereas the amount of foreign material in the lump was actually very small. The difference between a "hair line" and a lumpy streak was purely a matter of degree, with an indefinite transition from the former to the latter. Density comparison showed it to be lighter than the matrix glass. The fine streak actually was visible floating in the feeder bowl and by fishing around we traced the streak coming in on the surface all the way back through the forehearth and across the refiner almost to the throat. We never did find it on the melter side, as might be expected.

As long as the streak was there and we didn't know where it was coming from we felt we might as well try to get rid of it, so we mounted a cooling wind funnel over the gap between the forehearth skimmer and the refiner wall. By putting a blast of air at this point we built in effect a dam at the point of entrance to the forehearth, the idea being to draw deeper glass free of the streak —which it did. After a short time the streak dived and came up from below. It was very insistant upon getting into the "Hinky-Dink." Then we forced the forehearth to run under pressure with an exceptionally heavy fire, to diffuse the streak. Actually, we only lock the "lump" out of the streak—it was still there although considerably more blended. Again we were saved by the Sunday shut-down.

On Monday morning, with the glass as usual looking lovely, we scurried over to the other side of the bridgewall—where we should have been in the first place, instead of satisfying our scientific curiosity over the cord itself. The cause was quite simple, as against the mystery we were trying to make of it. The optical pyrometer gave the answer—which was the existing curve in the melter, shown by the solid line in Fig. 6. This curve was shifted over forthwith to the one shown by the dotted line and we waited for Thursday night at 8:00 P.M. Needless to say the furnace ran through the rest of the week beautifully and for every week thereafter without recurrence of the lumpy streak.

Actually it would be possible, though not desirable, to produce a satisfactory melt even with the differential curve that existed at the time—but not at that temperature level. In other words, unmelted batch was actually getting down as far as the hump shown. With higher temperature it would have disappeared earlier in the furnace and probably said inhomogeneous streak would have been absorbed before getting to the throat. However, the same thing was accomplished by straightening

(*Continued on page* 95)

SUPREME COURT DECISION . . .

(*Continued from page* 71)

to perpetuate any improper monopoly or patent pool. It further ordered the unexpired patent purchased should be dedicated to the public, in accordance with Corning's offer, if any danger of monopoly should be found to exist. In other respects the agreement between these two companies was allowed to stand.

Further consonant with the general rules laid down by the Court and quoted above with respect to ownership and licensing of patents, the Court ordered an injunction against the prosecution of any infringement actions brought by the defendants on patents relating to glassware machinery or the manufacture of glassware which were pending at the time of the decree. It reversed the lower Court in part and provided that the decree should be without prejudice to the future institution of suits for asserted infringements against persons refusing to take licenses under any of the presently licensed inventions arising out of their use after the date of the decree. It further held that the decree should not forbid any defendant from instituting infringement actions for acts occurring after the date of the decree on patents not covering feeders, formers, stackers or lehrs.

Effect of the Decision upon Use of Patents

So far as the glass industry is concerned its members other than the defendants, are free to deal with patents individually under the same provisions of law that they have always been. In addition, as the decision of the Supreme Court now stands and when a decree is entered thereon, any manufacturer of glassware has the right to obtain a license upon the payment of reasonable royalties for the use of feeders, formers, stackers, and lehrs, and patents covering these or improvements thereof. So far as the licensing of patents with the usual restrictions by individual patent owners is involved, whether in the glass industry or otherwise, the Court does not seem to lay down any new basic principle of patent law or Anti-Trust Law.

Whenever patents are cross-licensed, either between members of a single industry or a large number of patents are pooled by an individual member or members, whether these patents are competing patents or improvement patents, there seems to be little doubt that if there is any tendency to restrain trade as a result thereof the Court would set aside such arrangements and require compulsory or at least non-discriminatory licensing of patents pooled by the companies whether singly or in combination.

The intention of the Court not to upset existing patent law rules or Patent Office rules was further indicated by the fact that it ordered deleted from the decree paragraphs which seem to restrain the defendants, acting alone, from acquiring patent rights in any glass making field other than by direct issue from the Patent Office on any patent or application covering any invention embodied or employed in glassware manufacture. The Court said that though the paragraph was not entirely clear, it was clear that it endeavored to enjoin all acquisition of patent rights (relating to glassware) other than non-exclusive licenses, and as such was inappropriate to restrain future violations of the Anti-Trust Act.

The Court also deleted from the decree paragraph "52" which dealt with the problem of surpressed or unworked patents insofar as it purported to enjoin the conduct of individual defendants. The decree should enjoin *agreements* and *combinations* with the object of "blocking off" or "fencing in" competitive inventions; but it should not restrain defendants acting alone and in the indefinite future from attempting to obtain improvements of machines or processes previously patented. The Court also ordered deleted a provision which enjoined the defendants from applying for a patent "with the intention of not making commercial use of the invention within four years." The Court said that such a provision was legislative rather than remedial and that it was not in a position to make new Patent Office rules or new legislation relating to the application and issuance of patents. The Court quoted from the well-established rule of Chapman vs. Wintroth, decided in 1919.

> " 'A party seeking a right under the patent statutes may avail himself of all their provisions, and the courts may not deny him the benefit of a single one. These are questions not of natural but of purely statutory right. Congress, instead of fixing seventeen, had the power to fix thirty years as the life of a patent. No court can disregard any statutory provisions in respect to these matters on the ground that in its judgment they are unwise or prejudicial to the interests of the public. United States v. American Bell Telephone Co., 167 U.S. 224,247.' "

In general, the provisions of the decree with respect to combinations or conspiracies between the defendants to perpetuate certain bad practices in the Patent Office or among themselves were allowed to stand but the Court refused to restrict individual action by the defendants in their future dealings with the Patent Office and placed them under the usual statutory provisions and rules of the Patent Office.

Injunction against Contracts between the Defendants

The Court ordered struck from the Trial Court's decree or judgment provision which would restrain the defendants acting separately from discrimination "by means of wholly exclusive or partially exclusive requirements contracts" or "otherwise" against another manufacturer of glassware or in the filling of orders for machinery on the basis of the size of the order, credit rating or other basis on the ground that the paragraph was vague and did not seem to be addressed to any practice indulged in or threatened by the defendants. It also limited another paragraph requiring court approval of all agreements between the defendants or of all contracts and licenses made persuant to the lower Court's judgment. The Supreme Court said that this was entirely too sweeping because the provision was without limit of time, might apply even to an employment contract or many other casual and innocent business transactions. Such a paragraph, if retained at all must be restricted in application to lease or license agreements and agreements respecting license and trade practices, productions, and trade relations made pursuant to the judgment. These provisions of the decree with the Court's modification thereof did not lay down any

(*Continued on page* 94)

(*Continued from page* 93)

new rules of law as respects the public in general. At most they are provisions which are part of the remedy fashioned to prevent recurrences of similar violations and to dissipate consequences of the violations found to exist.

Stock and Bond Ownership and Directorships of Individual Defendants

The Trial Court enjoined the individual defendants from holding directly or indirectly the stock, bonds, or other evidences of indebtedness of more than one corporation engaged in the manufacture of glassware or glass making machinery whether or not such corporations were defendants and whether or not they were in competition with each other. The Court said this injunctive provision was entirely too broad, pointing out instances of where it would work unnecessary hardship and not achieve any desired result of preventing violation of the Anti-Trust Laws. It said that the decree should be modified to prohibit acquisition of stock or bonds of the corporate defendants by another corporate defendant and to prohibit the acquisition of stock or bonds by an individual which would give him, by reason of such stock or bond ownership, a measure of control in a company competing with that one with which such official was connected or a subsidiary or an affiliate of such company. Substantially the same principle was applied with respect to the holding of offices or directorships in glass making or glass machinery making corporations. The test to be applied is whether such directorship was in another corporation which was competing with the first corporation with which the director was affiliated. The same principles would also apply to the acquisition of the business or assets of one corporation engaged in the glassware industry by another such corporation. Though the Court did not expressly refer to the provisions of the Clayton Act dealing with these or analogous problems, it would seem that it did not intend to lay down any general extension of the rules which have been established for the interpretation of the applicable provisions of the Clayton Act relating to stock ownership, interlocking directorates, etc.

Analogous principles were followed by the Court in its treatment of the injunctive features of the Trial Court's decree as respects the individual defendants. The Court pointed out that the Trial Court in many paragraphs of the decree restained the individual offices, agents, and employees of the defendant corporations. The Court pointed out that there was no evidence that the individual defendants had engaged as such in the manufacture of glassware, glassmaking machinery, or dealt in patents relating to such. If any of the individual defendants ceased to be officers, directors, or agents of the defendant corporations they should be free to pursue whatever lawful business activity they chose free of restraint of the injunction. This is not to say that the individual defendants have not participated in violation of the Anti-Trust Laws if so found by the Trial Court, nor is it to say that they are necessarily free from action under Section 14 of the Clayton Act, the penal section making liable individual defendants or officers who authorize violations of the Anti-Trust Laws by their employer corporations.

Effect of the Decision upon the G.C.A. and Trade Associations

The Trial Court did not dissolve the Glass Container Association but it did compel the Association to abolish its statistical committee, to refrain from engaging in activities similar to those formerly engaged in by that committee. It also enjoined the Association from retaining any of its present officers, directors or employees, who were defendants or who were such officers, etc. of any defendant corporation, or from electing such persons as officers or employees. The Supreme Court took the view that because of these injunctions, functioning of the Association practically had been destroyed. It concurred in the finding that the Association had been an instrument in the violation of the Anti-trust Laws. The Supreme Court accordingly ordered the dissolution of the Association and further ordered that the corporate defendants be restrained for a period of five years from forming or joining any "such" trade association (probably meaning an Association composed of members engaged in the manufacture of glass containers and certain non-container ware as such are defined in the decree). After the five year period, the corporate defendants may apply to the Court for leave to join a trade association upon a proper showing.

The above does not mean that the Supreme Court will act similarly in other cases of violation of the Anti-trust Laws where a trade association is made a defendant. Whether such action might be taken would seem to depend upon the extent to which the trade association was an instrument in furthering violations of the Anti-trust Act. Nor could it be said that the decree affects trade associations generally speaking, other than to point out clearly the kind of activities which in this case were considered as in furtherance of the general conspiracies charged. The principal activities of the Glass Container Association which were found to further the general conspiracies were that it discouraged entrance of new companies into the glass container manufacturing field, that during a part of the period covered by the complaint and up to July, 1939, it had disseminated statistical reports which the Lower Court found were used to establish production quotas. After July, 1939, however, the Association had abandoned the voluntary exchange of such statistical data and other statistical data amounting to forecasts of production and had confined its reports to past performances of the members.

As a further indication that the Supreme Court did not enjoin the defendants from submitting to some independent agency statistics of their past performances and receiving back from such an agency industry statistics in *composite form*, one of the usual activities of a trade association, the Court went to considerable length in modifying certain provisions of the decree of the Trial Court relating to the collection and dissemination of statistical data. Without going into the minutiae of these changes it may be said generally that the provisions of Paragraph 40 of the decree of the Trial Court (dealing with statistics) were modified as to permit the collection and compilation of statistical data where there

(*Continued on page* 97)

FURNACE OPERATION AND CONTROL

(*Continued from page 92*)

up the furnace firing and changing the shape of the curve.

As for the cord or lumpy streak itself, spectrographic and chemical analysis both indicated that the foreign material was of refractory origin, probably from the tuckstones. With the unbalanced firing condition this viscous material was probably swept off and carried too far down the furnace.

The most important thing: Viz.—why the existing curve got to where it was in the first place, lies again in distribution of a concentrated fuel by burner jets. This furnace was fired by natural gas, with "burners" opposing one another at each port. The sharp-edged orifice at the face of the block was eroding quite fast, thereby disturbing the position of the flame. The operators, in order to avoid changing burner blocks too frequently, naturally were inclined to re-balance the port fire occasionally by reducing the valve port opening on one side or the other—with the eventual cumulative effect that the last two ports (Nos. 4 and 5) on which orifice erosion was least, gradually grabbed more than their proportionate share of fuel. The operators were commendably taking optical readings on the bridgewall hourly. The bridgewall temperature, they made sure, held steady—but the temperature back in the furnace was not distributed the same as it was originally.

FORMATION OF AMERICAN SOCIETY OF LUBRICATION ENGINEERS ANNOUNCED

Lubrication engineers representing prominent industrial and transportation companies and educators have organized a non-profit body known as the American Society of Lubrication Engineers, with headquarters in Chicago, Illinois.

A recent bulletin states that "lubrication engineers have felt for years the need of a national organization pertaining directly to their profession. Our objective is to put on a sound basis the fundamental precepts of lubrication, which we believe will be of benefit to all phases of industry with their many related problems. . . . We also believe that the endeavors of our Society can be accomplished without conflict with or injury to existing engineering societies having lubrication subdivisions."

Membership consists of representatives of the educational field, machinery builders, lubricant suppliers and consumers as represented by the various phases of industry. A further aim will be "to promote the subject of lubrication in the various educational institutions to better prepare future members of industry for a more complete understanding of the operational problems to follow."

The Society's first national convention will be held in the Stevens Hotel, Chicago, February 8 and 9. The program, under the direction of Chairman E. M. Kipp, of the Aluminum Company of America, has been formulated primarily around technical papers by leading authorities on subjects pertinent to the lubrication profession. The subjects will be varied to include a great many types of industries, all concerned with lubrication.

FIBERGLAS CONVEYOR BELTS GIVEN SEVERE OPERATING TESTS

Longer life for rubber-fabric conveyor belts subject to severe operating conditions is forecast by the performance of experimental Neoprene-coated Fiberglas fabric belts made by B. F. Goodrich Company and tested on a factory conveyor line operating on a continuous 24-hour, 7-days-a-week schedule.

Temperature of the material carried by the belts averages 300 degrees, Fahrenheit. The belts are subjected to considerable flexing and are exposed to contact with oil used in the binder of the material carried. Average life of rubber-covered cotton belts exposed to these conditions has been six weeks.

Eight Neoprene-Fiberglas belts, three-sixteenths of an inch thick and four inches wide, were installed on the conveyor line. One belt was burned through by a piece of red-hot material after three months' service. A second belt failed at the end of six months because of extreme stress at a time of operating difficulty.

At the end of seven months' service, the other six belts are still performing efficiently. Because of the Fiberglas fabric's high resistance to elongation, adjustments to keep the belts in even tension have been practically nil.

In fabricating the Neoprene-Fiberglas belts two inner plies and two outer plies of Fiberglas cloth, 36 inches wide, were given a thin coat of Neoprene and then calendered to obtain the required thickness of coating. The coated, uncured plies were assembled; the Neoprene cover was applied.

The entire assembly was then press cured and cut to required lengths and widths.

PIATT NAMED CONSULTANT OF WPB GLASS CONTAINER AND CLOSURE SECTION

Louis Piatt, head of the Home Canning Division of Anchor Hocking Glass Corporation, Lancaster, Ohio, has been appointed glass and closure consultant in the Glass Container and Closure Section, Containers Division, War Production Board.

Mr. Piatt has served in various capacities in both the container and closure divisions during eighteen years of service with Anchor Hocking.

★ BUY WAR BONDS ★

INVENTIONS AND INVENTORS . . .

(*Continued from page* 82)

which consists in heating the sheet or plate approximately to its softening point, chilling the sheet uniformly throughout its area to an extent sufficient only to impart to the sheet a superficial skin and thereafter further chilling the sheet differentially whereby predetermined zones of different temper are established in the sheet." The invention is applied particularly to advantage in cases in which it is desired to create relatively narrow zones of particularly high temper, which it will be recalled, Long has previously considered an advantage for windshield glass. He states that when attempting to produce such a result by ordinary tempering methods he obtained local deformations, and that these do not appear in his new process where the first step is to apply a moderate over-all temper to the entire sheet.

Theodore G. White received patent 2,365,503 (American Window Glass Co.) for methods and apparatus for scoring cover glass. The sheet is supported on a perforated table top to which it is held by suction.

In making mineral wool by the method of patent 2,365,970, Gale T. Pearce of Somerville, N. J. (Johns-Manville Corp.), blows the fibers into a settling chamber against a horizontal cylindrical baffle so that they fall more or less individually through the so-called dead air space beyond the baffle.

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NATIONAL SANITATION FOUNDATION ORGANIZED

Announcement was recently made by Dr. Henry F. Vaughan, dean of the School of Public Health of the University of Michigan, of the formation of the National Sanitation Foundation—a non-profit organization sponsored by industry to make continuous research studies in the field of sanitation.

The foundation has been chartered by the State of Michigan and will have its headquarters in the School of Public Health at Ann Arbor. Dr. Vaughan will serve as president; Dr. Nathan Sinai, Professor of Public Health at the University, will be vice president; and Walter Snyder, chief of the Bureau of Sanitation of Toledo, Ohio, executive director.

The immediate goals of the Foundation's program are studies to determine the most efficient methods of sanitizing food utensils and more accurate methods of testing the results. When conclusions are formed from these studies it will be possible for health departments to adopt more practical and uniform sanitary codes.

Several machine-made glassware manufacturers and allied industries have shown much interest in this program, since they realize the importance of providing clean utensils for the use of the public in restaurants, fountains, hotels and bars. The officers of the Foundation believe that manufacturers of hand-made bar and restaurant glassware—when fully informed of the goals of the Foundation—will also be interested in contributing to its support.

The Foundation is incorporated along broad lines, but one of its first problems is to study and develop better methods for cleansing eating and drinking utensils—glass, china, and silver—and then publicize its findings to public health officers.

The activities of the Foundation will not only be of great service to the public in improving general health but also will help protect the glass tableware, bar, and tumbler market which might be seriously curtailed if public health officers should insist that only single service utensils could be used in public eating and drinking places until assurance could be given that clean utensils would always be available for serving food and beverages.

Larger glass companies have contributed $10,000 each for the first year's operations with other industry subscriptions varying downward for companies having less sales volume.

ALLOCATION OF POTASSIUM CARBONATE ANNOUNCED

On January 10th the War Production Board issued Schedule 85 to General Allocation Order M-300—the order which allocates potassium carbonate.

This order provides that on the 15th of each month during, the life of the order, glass manufacturers must fill with the Chemicals Bureau in Washington their purchase requirements by grades for the following month and their estimated inventory as of the first day of the requested allocation month.

• William E. Cash has been named manager of the Glass and Closure Division section of the Advertising and Promotion Department of the Armstrong Cork Company.

SUPREME COURT DECISION . . .

(*Continued from page 94*)

is no purpose or agreement intentionally to persuade any manufacturer to limit or control production, to fix, raise or maintain the prices of glassware or glass machinery. It seems further that the Supreme Court does not consider unlawful the collection, compilation, analysis and distribution of data concerning the production, sales, orders, shipments, costs or prices of glassware or machinery used in the manufacture of glassware where all of such data is disseminated to the individual manufacturer in *composite form* and not in any manner so as to disclose such data as respects the activities of one manufacturer to another. We would expect the final decree of the Trial Court to recognize this right.

In addition the Court deleted from the same paragraph 40, dealing with statistics, a provision which prohibited the distribution of statistical data relating to the manufacture of glassware or machinery used in the manufacture of glassware unless such information was made fully and fairly available to the general public. As respects this provision, the Court said:

> "The requirement that all trade information be given to the public would render the assembly of it for the information of members useless and indeed detrimental to competition."

Possible Future Course of the Litigation

The opinion of the Supreme Court reviewed above is not a judgment or injunction against these defendants as such; it vacates the decree of the Trial Court and directs the Lower Court to enter a new decree or final judgment in conformity with the opinion. There yet remains the settlement of the many detailed provisions which will become a part of the final judgment. In the first instance and in all probability, counsel for the Government and the defendants will endeavor to agree upon the wording of the provisions of this new final judgment and which will replace the final judgment of the Trial Court entered Oct. 8, 1942. To the extent that counsel for both sides are unable to agree upon such provisions of the judgment to be entered, the Trial Court will pass upon the disputed questions and ultimately the final judgment will be entered. After final judgment is entered pursuant to the opinion, any of the parties may petition the Supreme Court for a rehearing within twenty-five days after the entry of such a judgment, unless the time is shortened or enlarged, by an order of the Supreme Court or one of its Justices. Such a petition for rehearing would *not* be granted however under the rules of the Supreme Court unless one of the Justices who concurred in the judgment, i.e., the majority opinion, desired it and the majority of the Court so determined.

As this issue of The Glass Industry goes to press, it was learned on good authority that the Government was preparing and would file by February 2 a Petition for Clarification and Reconsideration with the Supreme Court. The Supreme Court could grant or deny this Petition. If it grants the Petition, both sides would be represented before the Supreme Court on the questions which the Government has raised. Whichever way the Supreme Court decides on the Petition, the case would then go back to the Trial Court for the entry of final judgment.

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WPB ISSUES TWO NEW ORDERS ON LEAD

General Preference Order M-38, controlling lead metal, has been amended as of January 15, 1945, and nullifies the order issued December 29, 1944. This new order denies the use of lead in glass for ornamental purposes.

Of further interest to glass manufacturers in connection with restrictions on the use of lead is Conservation Order M-384, issued January 15, 1945. This order places control of all the lead metal with the Chemical Bureau in Washington.

J. E. SMITH JOINS WICKWIRE SPENCER METALLURGICAL

The Wickwire Spencer Metallurgical Corporation—a recently formed subsidiary of the Wickwire Spencer Steel Company—has announced that J. E. Smith has become associated with the organization as foreman of Fabricated Parts Department.

Previous to his joining Wickwire Spencer, Mr. Smith was with the Western Electric Company at Kearny, New Jersey. Prior to that association he had been with the Peoria Power and Light Company and the Carter Machine and Electrical Manufacturing Co.

G. L. S. BIRD OF ARMSTRONG CORK RETIRES

G. L. S. Bird, who for many years has been the Washington, D. C., drug sundries representative of the Glass and Closure Division of the Armstrong Cork Company, retired on January 1. He was associated with Armstrong and the Whitall Tatum Company for thirty years. Mr. Bird's successor is William Sarka, who will cover Baltimore and parts of eastern Maryand, in addition to Washington.

Other changes in the Division were announced at the same time. C. W. Dudley is being transferred from the Main Offices to the Philadelphia Sales office of the Division. He will cover the territory relinquished by H. S. Duckworth, resigned.

T. E. Neale, who recently joined the Division after many years of experience in the glass business in the Middle West, has been assigned to the Division's Indianapolis sales office.

FIBERGLAS PLANT ISSUES CIGARETTE RATION CARDS

On January 8th cigarette rationing started at the Newark, Ohio, plant of Owens-Corning Fiberglas Corporation. On that date the Fiberglas Club, an employee organization which handles the sale of cigarettes on plant property, issued ration cards to employees in order to assure each worker an equal share of available supplies.

Rationing is on a weekly basis, with the number of packages allotted to each person depending on the supply on hand. Cards are punched for each purchase.

• Among the hundreds of concerns agreeing, during the month of December, to voluntarily pay back wages and overtime to employees are two New Jersey glass companies. The Gaynor Glass Works of Salem will pay $2,433.78 to 258 employees. The Phillips Lens Company of Middlesex will pay seven employees a total of $204.76.

DR. ELLEFSON RECEIVES NEW APPOINTMENT AT SYLVANIA ELECTRIC

Announcement has been made by the Sylvania Electric Products Incorporated of the appointment of Dr. Bennett S. Ellefson as Assistant to the Vice President in charge of Engineering.

Associated with the company since 1937, Dr. Ellefson has specialized in research on fluorescent screens, special uses of glass, fluorescent powders for cathode ray tubes and specialized war products. He holds a number of United States and foreign patents on fluorescent materials and glass, including certain special war products.

Prior to joining Sylvania, Dr. Ellefson conducted important research on industrial chemical processes. He holds a B. A. from St. Olaf College, M. S. from the University of Minnesota and Ph.D. from Pennsylvania State College.

PROBABLE RATIONING OF NATURAL GAS TO INDUSTRY

Recently all manufacturers of glassware in the Appalachian natural gas area were contacted by the WPB Chemicals Bureau in Washington regarding their fuel requirements. This information was sought because of the lessening natural gas supply in that area which probably will lead to a rationing of gas to all industry —unless engaged in production of direct government war contracts—during the time when household requirements are highest.

It is expected that sufficient natural gas will be allotted all glass companies so that in conjunction with whatever fuel is produced by their standby equipment, holding temperatures can be maintained on glass tanks and furnaces.

STAFF CHANGES AT UNIVERSITY OF ILLINOIS

Floyd A. Hummel, B. S. in Ceramics 1937, recently accepted a position as Special Research Assistant Professor in the Department of Ceramic Engineering at the University of Illinois. He is working on the Army Air Forces co-operative research project on the development of special ceramic coatings.

From 1937 to 1939, Mr. Hummel worked for the Onondaga Pottery Company at Syracuse, New York, and after a year's graduate work in physical chemistry, returned to the Onondaga Pottery Company. In November, 1941, he joined the research staff of the Corning Glass Works, where he remained until joining the staff of the Department of Ceramic Engineering.

Louis M. Doney, B. S. in Ceramics 1940, recently employed at the University as a Special Research Associate, left the staff of the Department of Ceramic Engineering to accept a position as Glass Engineer for the Sylvania Electric Products Company at Emporium, Pennsylvania.

Gunite's Standard grade A for

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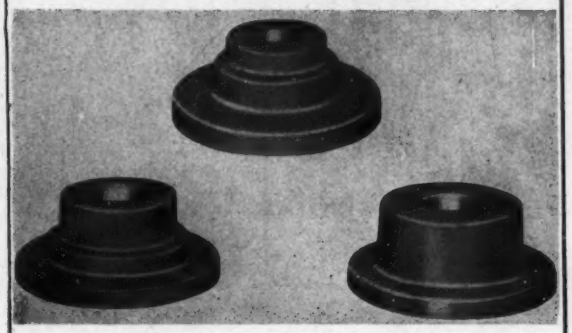

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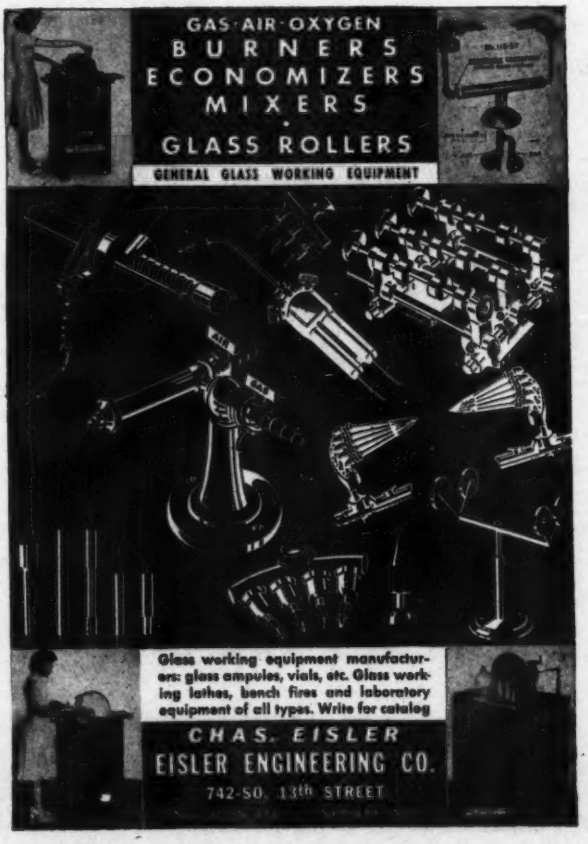
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